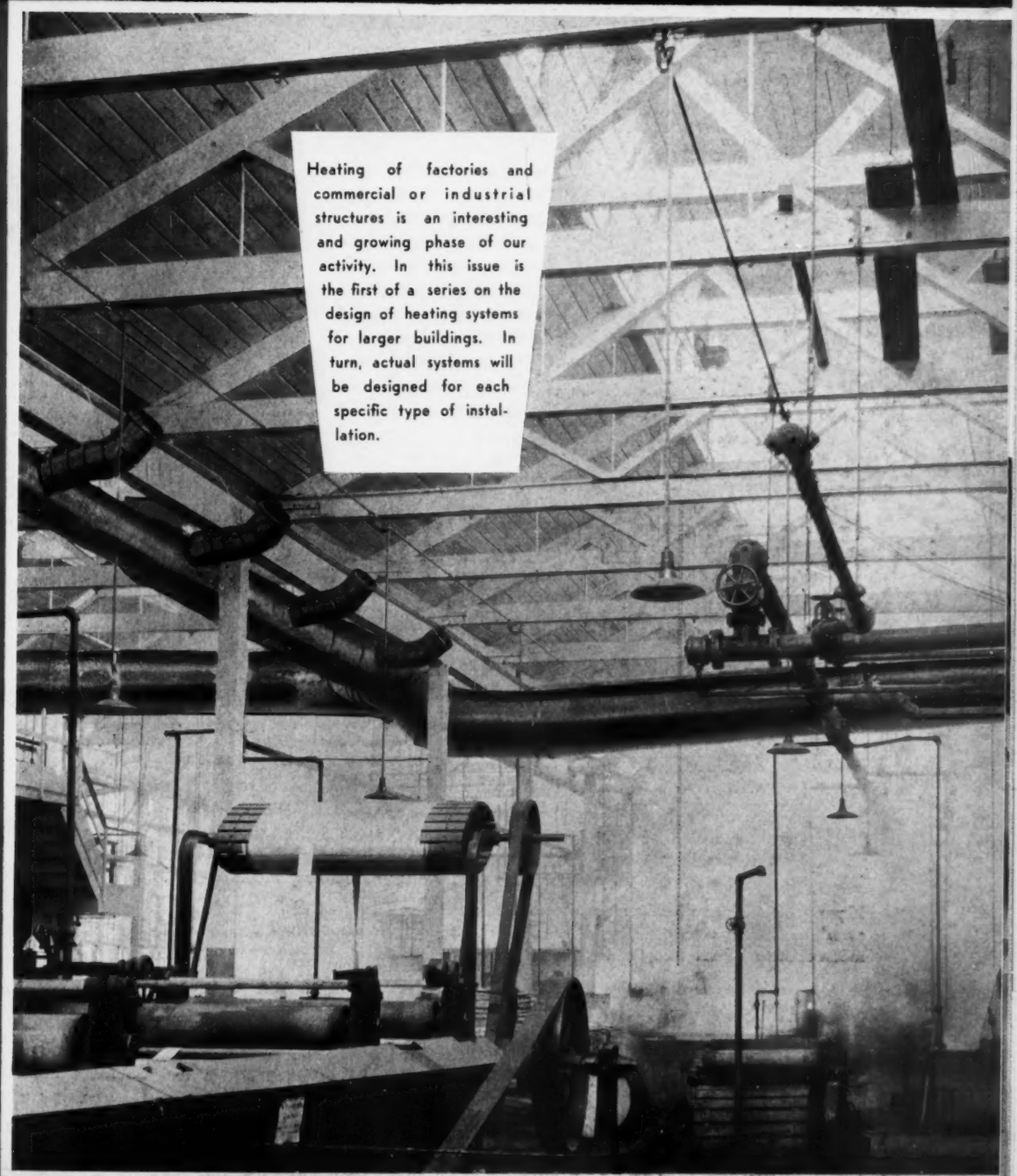
AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING



Heating of factories and commercial or industrial structures is an interesting and growing phase of our activity. In this issue is the first of a series on the design of heating systems for larger buildings. In turn, actual systems will be designed for each specific type of installation.

TABLISHED
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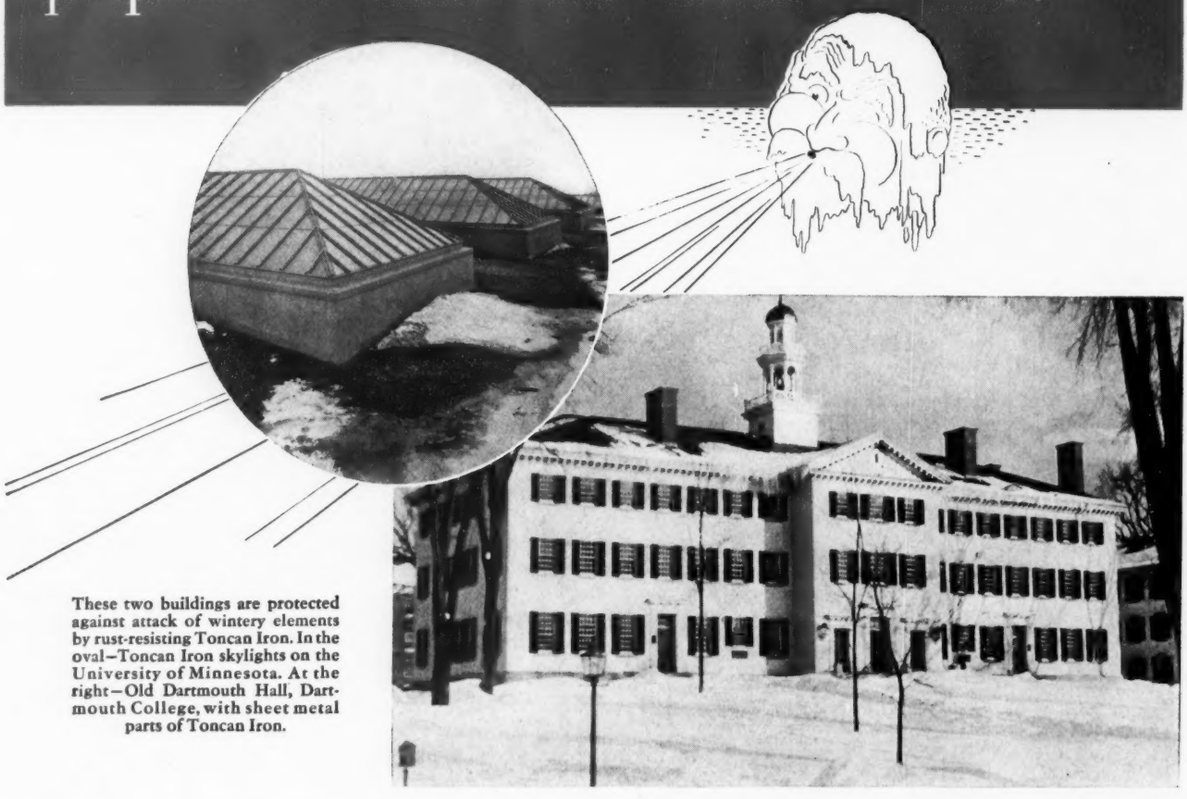
THE AIR CONDITIONING SECTION

Are your customers' buildings prepared to stand next winter's attack?



These two buildings are protected against attack of wintery elements by rust-resisting Toncan Iron. In the oval—Toncan Iron skylights on the University of Minnesota. At the right—Old Dartmouth Hall, Dartmouth College, with sheet metal parts of Toncan Iron.

NOW IS THE TIME TO PROTECT THEM WITH-

Last winter's severe cold and heavy snow wrought havoc with many buildings, particularly those with rusted sheet metal parts.

Some of these buildings have undergone repairs this summer—others are still in need of sheet metal work probably, in many cases, because the importance of repair at this time has not been brought to the owners' attention.

Now is the time to obtain this business—before weather conditions prohibit outdoor work. And here is a material, the advantages of which may help you to secure additional jobs.

Toncan Iron used for the sheet metal work will insure economical protection for years to come. It is an alloy of refined open-hearth iron, copper and molybdenum with the greatest rust-resistance of any ferrous material in its price class. It has established records of more than 28 years of low-cost service. And it is easy to fabricate.

If you would like to know more about this long-lasting, business-building sheet metal, write for a copy of "The Path to Permanence" and find out how other sheet metal contractors are using it.

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Look to Republic as a major source of supply for flat and corrugated sheets—Plain Carbon Steel, Copper-Bearing Steel, Copper-Bearing Iron, Toncan Copper Molybdenum Iron and the famous ENDURO Stainless Steels. A quality of sheet for every degree of corrosion-resistance.

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When writing Republic Steel Corporation for further information, please address Department AA

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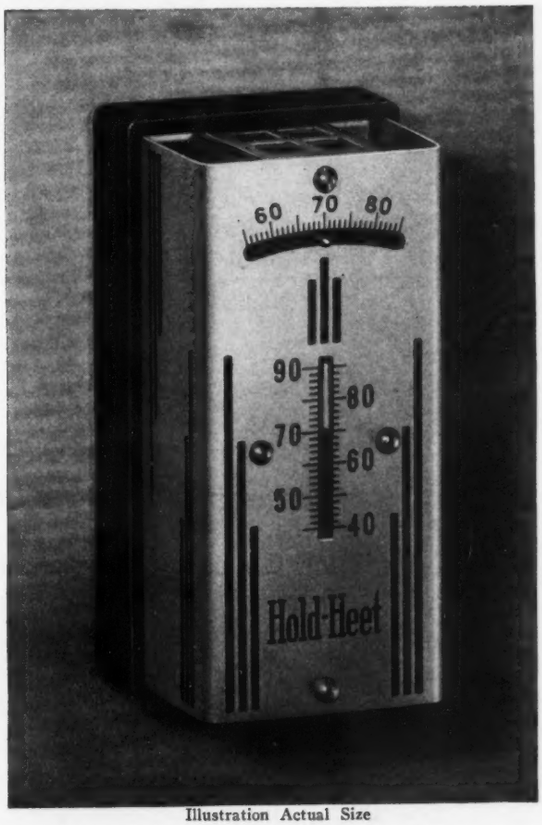

This beautiful new $7.50 thermostat is now included in the Hold-Heet De Luxe Regulator set without additional charge.

Illustration Actual Size

Outstanding **Quality** and a tested Sales Plan !

HERE IS YOUR CHANCE to cash in. The finest heat regulator set ever built: The new jewel-like Hold-Heet Room Thermostat, solid etched rich low brass inlaid with black enamel, guaranteed accurate to 1 degree. The bakelite covered Hold-Heet Damper Motor is the most powerful built—rated at 25 lbs. will lift 100. An Underwriter's Transformer. And, the Hold-Heet Combustion Control—the outstanding contribution to control of hand-fired heating plants. All with chains, pulleys, staples and wire, priced for profit so that you can make your full selling profit and labor profit and sell installed for $36.00.

Here is equipment you can sell with confidence for it is fully guaranteed. Not one cent has ever been paid for repairs to HOLD-HEET. (If any Hold-Heet unit doesn't work perfectly we will immediately repair it or replace it without question or charge.)

100 Circulars ***FREE*** with every Hold-Heet De Luxe Regulator Set. Beautiful, new, 2-color, 4 page envelope stuffers that find prospects for you. Here is exclusive equipment that is head and shoulders above all competition *in quality—in performance—in value.* When you sell Hold-Heet you sell the best. . . . Write today for proven sales plan with free sales helps.

Stock by leading jobbers and Furnace Manufacturers

Combustion Control

The last word in heat regulation, a big step beyond ordinary "Automatic Heat." Combustion Control replaces passive, indirect control with sensitive, direct control. It regulates more than room temperature; regulates fire temperature as well.

COMBUSTION CONTROL a time-proven, thermostatic switch that is installed in the smoke stack close to the fire, double checks the operation of drafts. (1st) STOPS OVER-RUNS, (2nd) PREVENTS UP-THE-CHIMNEY WASTE—saves as much as 20% on fuel, (3rd) PROTECTS THE HEATING PLANT—furnace manufacturers are guaranteeing firepots for 20 years where a Hold-Heet Combustion Control is installed.

COMBUSTION CONTROL is more dependable, it does not depend for action on radiation from over-heated furnace castings (like bonnet limit controls). The time proven rod and tube action is good for the life of the heating plant. The Combustion Control will work with any make of regulator set. Lots of your old installations can be "saved" by installing a combustion control.

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Only a Furnace System can deliver effective Summer Cooling at low cost.

In This Issue

From different parts of the country comes word that contractors are up against a shortage of good, active mechanics. A rapid survey by association officers, discloses some interesting and alarming facts. See page 14.

*

And on page 13 we suggest some things which can be done to remedy this mechanic shortage situation. Your suggestions are invited.

*

This fall thousands of contractors are or will stage cleaning campaigns. The plans followed are numerous and some are highly interesting. On page 16 we report a card campaign from Indianapolis based upon last spring's effort.

*

Many employers fail to appreciate how state laws effect the Social Security bill's application. On page 20, J. G. Dingle continues his series with tables showing just what percentage of payroll dollar must be set aside to meet Federal and State requirements.

*

The heating of large buildings—schools, factories, churches—has always been an interesting and important phase of our activity. Believing that this class of work is due for a large expansion, we have asked Platte Overton to write a series in which a complete design will be presented for each type of building.

*

The first article in the Air Conditioning Section (page 37) presents for the first time the results of exhaustive tests to establish pressure losses for small rectangular elbows of all radii and size. Readers will find heretofore unknown facts.

*

Eugene Farris completes his series on Cost Per Pound vs. Price Per Opening on page 40. He takes his typical job and shows just how much difference there is between actual cost and the "guess" by number of openings. The difference is staggering.

*

P. H. Geiger completes his two articles on noise from registers on page 42 with suggestions on how to prevent or eliminate such noise.

*

Facts from the Research Residence continues on page 48 where S. Konzo explains the conditions under which supply and return ducts should be insulated. He presents some "too-often" neglected conditions.

*

For those anxious to understand the relationship of air movement, temperature, humidity to physical comfort the article on page 52 will be welcomed. The author charts the relationships for everyday use.

AMERICAN ARTISAN

With which is merged

FURNACES and SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning

J. D. Wilder, Editor

Vol. 105, No. 9 — September, 1936 — Founded 1880

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TWO STEPS *in selling that* LEAD *to* JOBS *like these*

Be sure you take them both when you call on Chemical and Process Plants

THERE are two steps that lead to every Monel Metal job . . . and your biggest success comes when you take them both.

Your customer is interested in his own work and the way his present Monel Metal equipment helps him get it done. But you can often open his eyes to other uses for Monel Metal around his plant. Suggest them to him.

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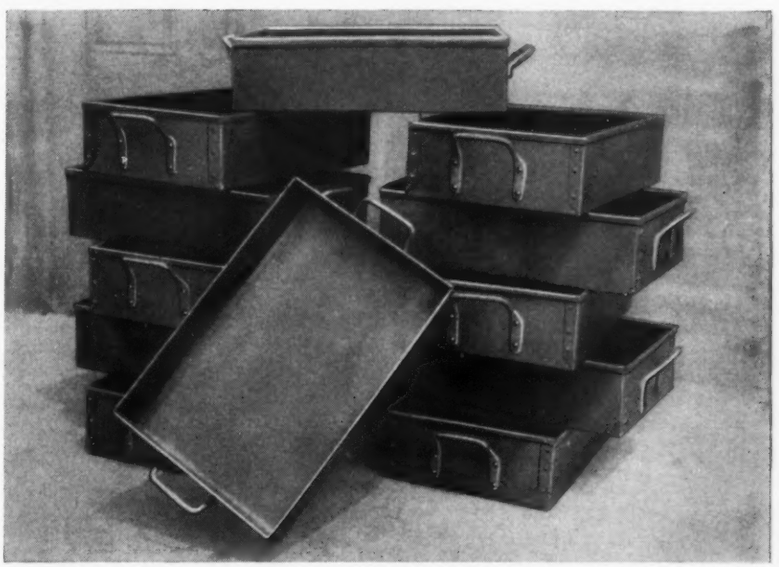
Always remind any prospect you call on that Monel Metal is rust-proof, resistant to corrosion, and tough, strong and durable. For those reasons Monel Metal is widely used in chemical and processing plants for drying trays, trucks, containers, hoppers, chutes, table tops, utensils, ventilating hoods, fume ducts, measures, percolators, steam baths, oven linings, and sinks.



Heavy gauge Monel Metal pans used in chemical plants where resistance to corrosion and ability to withstand rough usage are of utmost importance. Joints made by riveting, using Monel Metal rivets. Built by Metal Products Corporation, Weehawken, New Jersey.

Write for working instructions and any other information you might need for going after this class of work. We will gladly help you.

• • •

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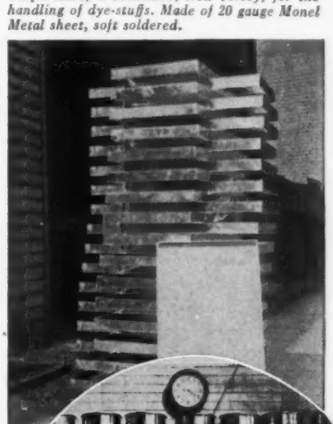
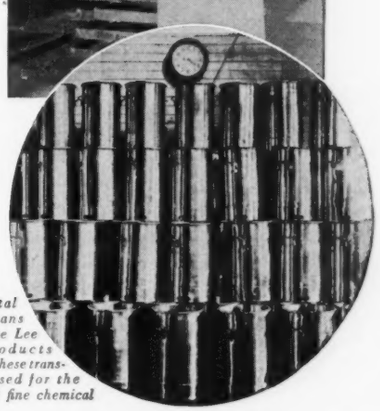
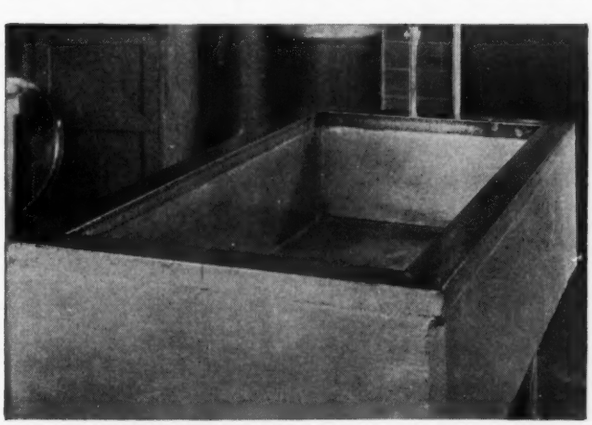
Monel Metal trays made by the Metal Products Corporation, Weehawken, New Jersey, for the handling of dye-stuffs. Made of 20 gauge Monel Metal sheet, soft soldered.

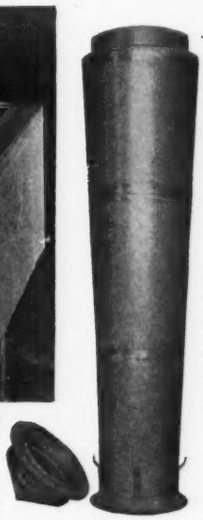




Monel Metal transfer cans made by the Lee Metal Products Company. These transfer cans used for the handling of fine chemical products.



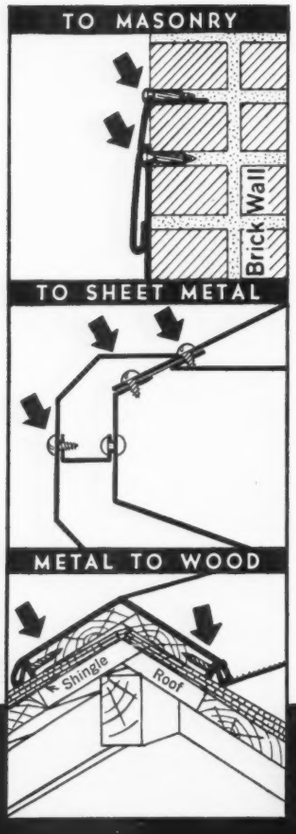
Concrete sink lined with Monel Metal sheet, lock seam silver soldered. This is one of a number of similar Monel Metal lined sinks used throughout a well-known pharmaceutical plant.



(At right) 16 gauge Monel Metal Percolator used by The Upjohn Company for the extraction of drugs from herbs. The percolator is 26" diameter by 95" high, gas welded throughout. Built by the Kalamazoo (Mich.) Sheet Metal Mfg. Co.

MONEL METAL

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.



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to Save Money on the three every-day fastening jobs

Making fastenings . . . to sheet metal . . . to brick, mortar, concrete . . . and sheet metal to wood . . . use up a good-sized share of your time and labor. It represents real money. Save a part of it. All you need to do it is a few boxes of the Modern Parker-Kalon Devices described below. They were especially developed to make fastenings easier, quicker, cheaper, better. You can get and keep on hand a sufficient quantity of the three different Devices for surprisingly little money. Your jobber has them in stock.

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Where fastenings to brick, mortar or concrete are required, Hardened Masonry Nails will save you time and do away with expensive devices. Substantial fastenings are made simply by hammering in the Masonry Nails, just as you drive nails into wood. Only in very hard material do you have to drill small starting hole.

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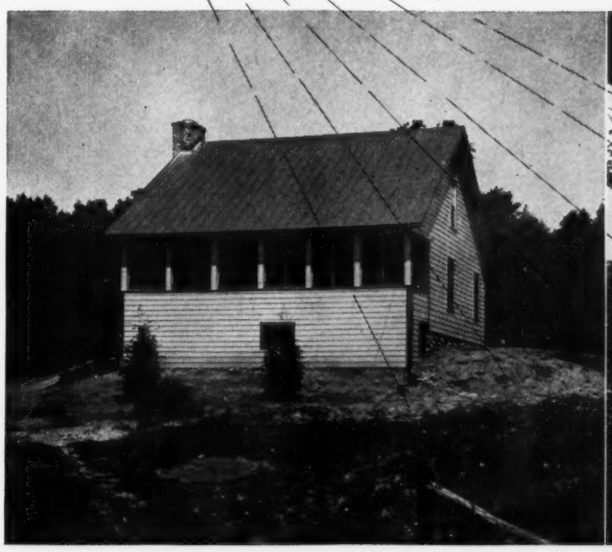
Anaconda Economy Copper Roofing was UNHARMED

by the same storm that felled this tree



HERE'S striking proof of the exceptional wind-resistance provided by standing seam Anaconda *Economy* Copper Roofing. Recently a severe lightning, wind and hail storm occurred in Connecticut. So much damage was done that news-reel photographers visited the scene and pictures were released for newspaper illustration and screen news.

This cottage, covered with standing seam Anaconda 10-oz. *Economy* Copper Roofing, is isolated on a hilltop and was in the direct path of the storm. But *the copper roofing escaped damage of any kind.* Nearby the house, however, the large tree shown at the right was completely uprooted. The unusual wind-resistance of Anaconda *Economy* Copper Roofing is just one of many selling points which you can use to your advantage and profit when talking with home owners about metal roofing.

Other features which will help you sell Anaconda *Economy* Copper Roofing

Good Appearance. Copper increases in beauty with age and service.

Durability. Permanent in spite of time and weather.

Fire-Proof. Copper roofs eliminate flying spark hazard . . . earn lower insurance rates.

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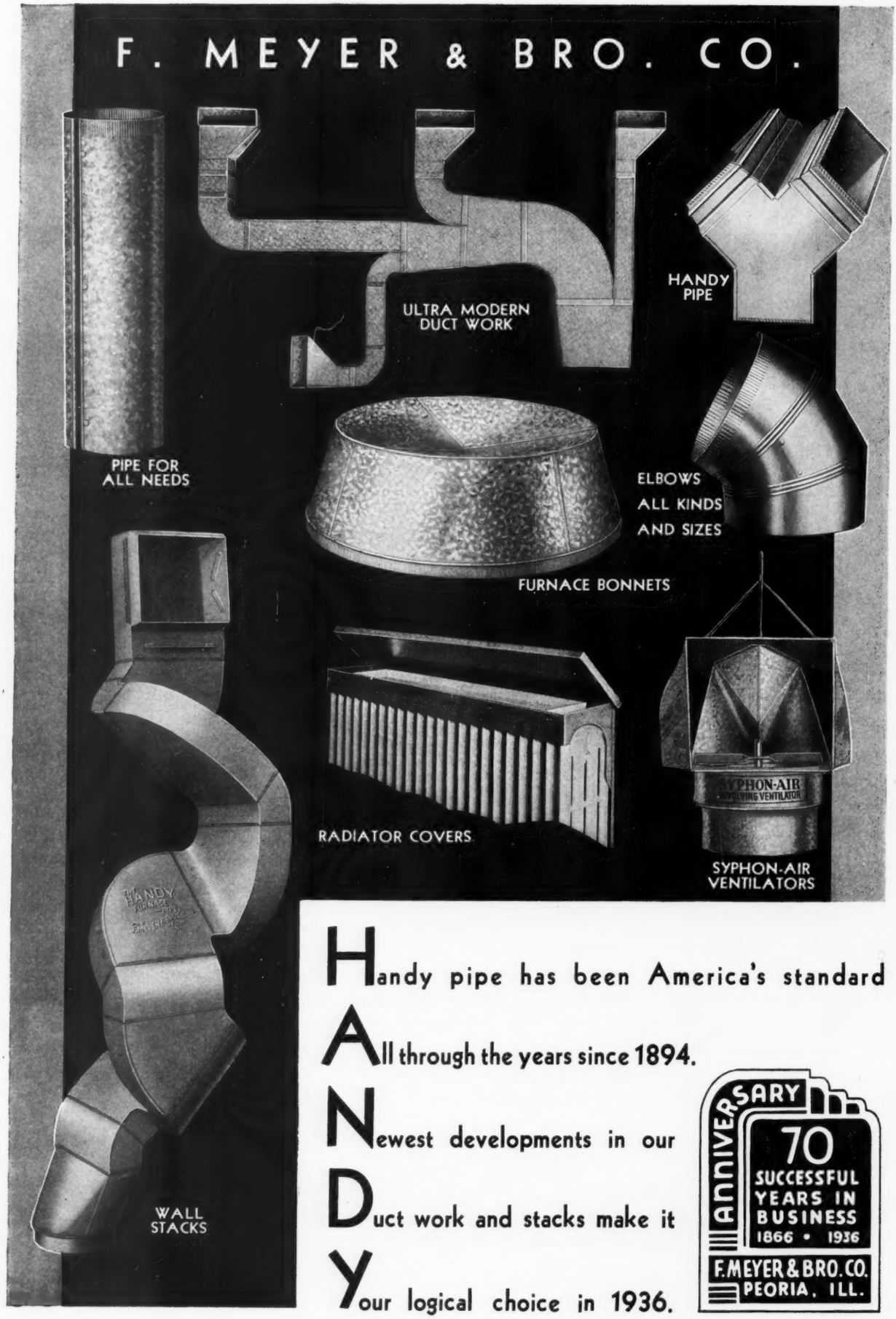
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DON'T YOU LOVE THAT ROOF-LINE?
I WAS JUST THINKING THAT THE GUTTERS AND FLASHING WOULD NEVER RUST.— THEY'RE COPPER.
IT WOULD BE FUN HAVING A PLAYROOM IN THIS BASEMENT — IT'S SO CHEERFUL AND CONVENIENT.
AND THE PIPING IS ALL REVERE COPPER TUBE. THE HOT WATER TANK IS COPPER, TOO!
THIS ROOM WOULD MAKE A SWEET NURSERY— WHEN WE NEED ONE
OUR CHILDREN MAY HAVE TO MAKE SOME REPAIRS IN THIS HOUSE. BUT WE WON'T
WILL YOU STOP POKING YOUR NOSE INTO PIPES AND LOOK HERE—THERE'S EVEN A SPRING ON THE PLACE
THIS DOWNSPOUT WILL NEVER SPRING A LEAK. THERE'S THE REVERE TRADE-MARK
LOOK beneath the surface when you buy or build . . . look for the vulnerable spots where rustable metals can pave the way for swift depreciation and early repair. Since 1801, Revere copper has been protecting American buildings. Your architect will specify Revere products . . . your contractor will be glad to use them. Both know that Revere quality means lasting satisfaction. Revere products for the home include: Copper Water Tube with Streamline soldered Fittings for water, oil and heating lines. Brass pipe. Sheet and strip copper and Leadtex (lead-coated copper) for gutters, downspouts, flashings and other sheet metal work. Copper and Herculoy for hot-water tanks and range boilers. Brass and bronze for hardware and lighting fixtures. Copper and brass giftwares.
FOUNDED BY PAUL REVERE
Revere Copper and Brass
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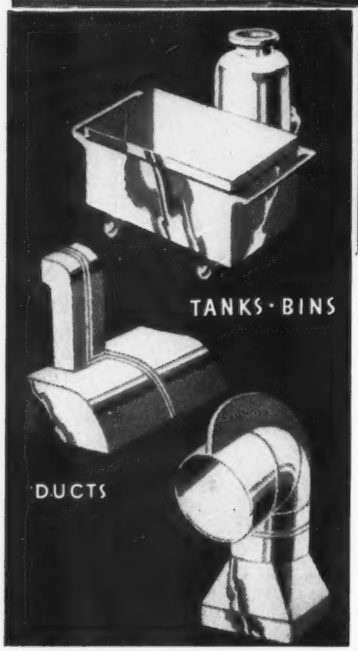
EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY



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Allegheny time-tested Stainless Steel opens new fields to the sheet metal men. Unrusting, unstaining, untarnishing — yet ductile, easy working and strong. When you need Stainless, specify Allegheny metal. In stock at all Ryerson plants. Immediate Shipment.

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More than 25 different kinds of sheets are carried in Ryerson stock. This wide range makes it easy to select the sheet best suited to each particular job. And you can get it immediately, in any quantity. In addition, one order can cover all your requirements for other steel products such as angles, channels, rivets, bolts, welding rod, etc. Combine your orders and save office work, time, trouble and money. If you do not have the current Ryerson Stock List, write, we will be glad to send it.

Partial List of Sheets Carried in Stock

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Armco Ingot Iron
Blue Annealed
Bullet Proof
Copper Alloy
Corrugated
Deep Drawing
Dynamo
Electrical
Enameling
Galvanized
Panel & Sign
Galvannealed
Heavy Hot Rolled
High Carbon
Hot Rolled Annealed
Locomotive Jacket
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RYERSON
STEEL-SERVICE

AMERICAN ARTISAN

Volume 105 Number 9

Suggestions for Meeting Mechanic Shortage

IN the first editorial section of this issue we publish comment by association officers bearing on the reported shortage of good mechanics now declared acute in some sections of the country.

That such a shortage can be acute all over the country, we very much doubt, but that the situation is serious enough to warrant careful study is amply indicated by the reports published.

Such a situation is both interesting and alarming.

Interesting, because if true, our sheet metal industry is probably the first division of the construction industry to have so much work under contract that contracts cannot be completed on schedule. Interesting if, as one man declares, he cannot take more work because he knows he cannot finish by fall work now started.

In this situation may perhaps be found one very satisfactory answer to the problem of the unemployed, ladder and snip mechanic-contractor who can make more money steadily employed by a reputable contractor.

Interesting, also, because such a situation conceivably cannot be of much benefit to those direct selling manufacturers who job out installation or waver from "own shop" to "jobbing" and back again and drive down both prices and quality.

The situation is alarming because it indicates that thousands of good mechanics must have gone into other industries and may not wish to return to the uncertainties of the construction field. No provision is in sight to replace these men.

Alarming also, because during the years of the depression the apprentice system has broken down and few, indeed, are the shops with apprentices in training. Training apprentices takes time and time may not be available.

If skilled, reliable men are not available, contractors naturally will have to hire less desirable mechanics who require more supervision, do poor work, draw eight hours pay for six hours work and generally disrupt any smooth working organization.

The real question is—"What can we do about it?"

At first hand it would seem that the solution ought to be worked out through our national association. But the national association is mechanically inoperative. Something might come of the movement between middle west state secretaries who plan to function through group meetings, but some central bureau for exchange of information must be set up. Local associations probably will be helpless because either they will need men badly or they won't need men—in either case their range of activity will be muchly restricted.

We suggest that these following things can be done.

1—National, state, local associations and groups should use all their influence to have local unions open their ranks to more mechanics or apprentices.

2—State associations, where active, should set up state-wide bureaus for exchange of information on conditions within their own boundaries and make it possible for mechanics wanting work to move from inactive to active communities.

3—State and local associations and bodies should cooperate with trade schools of all kinds in their areas to make the training more practical and faster and to get the right kind of young men interested in our trade.

4—Manufacturers of all products, having steady production, should, where possible, take young men in for training, especially where a manufacturer has a local selling outlet where installing is carried on. Selfishness on the part of the manufacturers will only kill the ultimate growth of our industry.

5—Employers of all sizes having steady work should take in apprentices for training even though this may cause some immediate sacrifice in profit.

6—Educational work and offers of higher wages should be made where more work means better prices to get ex-mechanics now working for themselves to come back into reputable shops.

7—Jobbers and manufacturers can greatly assist if they will tighten up their credit requirements to eliminate those mechanics who are now only getting day wages for work taken from legitimate shops.

8—Associations and groups should work for licensing agreements which make financial and mechanical ability requisites for being in business.

As an item to be carefully considered, every contractor—because he is also a taxpayer—ought to acquaint local relief agencies with known shortages of mechanics so that men who can work—but won't—can be made to take work offered. This is a cure for our own problem and also for the general reduction of the now all-to-heavy relief costs.

As a last suggestion American Artisan offers — in view of the lack of any centralized bureau—to act as a clearing house for information. Contractors or groups needing mechanics may write us and state their needs and these needs will be passed along to other associations operating in localities where mechanics are out of work.

Conversely, localities having good mechanics unemployed may submit names or facts to us so that such information may be passed along to groups or localities needing mechanics. Such an exchange of information may be of particular assistance to those open shop localities where the unions offer no assistance.

Is a Mechanic Shortage Imminent?

This article gathers together replies from active association officers and individuals who have already taken action on the problem of threatened mechanic shortage. Undoubtedly, many others have taken steps to prevent future trouble and the suggestions of such men are invited. If action is needed, right now is none to early.

IN the past few weeks American Artisan has received letters from several organizations and individual contractors asking what can be done to relieve a shortage of good mechanics. Those writing have stated that in some sections such a shortage is already serious and getting more so. Far sighted individuals have declared that if this condition spreads, the industry may shortly find itself face to face with the question of how to complete work bid in and ultimately may find it impossible to maintain full schedules because work cannot be completed on time.

A quick survey of the situation by means of letters addressed to officers of active associations has brought in several interesting replies, indicating the extent of the shortage and illustrating some of the consequences to be anticipated if the problem becomes more general.

◆

New York City

In answer to your letter of August 22nd, 1936, with reference to the shortage of sheet metal mechanics, I wish to advise that contractors here are facing a most serious situation. There is not only a shortage of sheet metal mechanics, but also a shortage of skilled labor in the allied fields, such as roofing and shingling.

One of our members reports that he has been advertising for skilled help daily during the past six weeks and that during this entire period only one man reported in answer to the advertisement. It turned out that he was a P. W. A. worker, looking for something to fill in his spare time.

Another of our members declares that he has been borrowing help from other members of the association as soon as their own jobs were completed. This condition prevails generally.

Some time ago, a group of our members waited upon the Mayor of the City of New York and informed him of the condition prevailing in the industry. It is the general consensus of opinion here, that the shortage is due to the fact that all of the skilled mechanics, who were out of work during the depression and during the last few years, have been placed on P. W. A. projects and have reachced the stage where they refuse to work for the private contractor, fearing the stability of their employment.

I am informed that the Mayor, in answer to this group, informed them that he could do nothing about it, inasmuch as federal funds had been allocated to him for certain projects, and that he intended to spend that money for the purpose for which it was earmarked.

You ask whether our members are returning to the apprenticing of young men. Business is so brisk and competition so great that the average of our members have found it inadvisable to hire unskilled labor. With reference to trade schools, there are quite a few trade schools in the metropolitan area. What happens to the graduates, we don't know.

I am informed that the union refuses to take any new members in, so that these graduates certainly could not find employment through the union shops. I am further informed that the average contractor locally is somewhat suspicious of the practical learning received by these trade school students, and so will not very readily hire them.

I certainly hope that inasmuch as the depression seems to have been conquered by our members that the governments, local, state and federal, and unions, will cooperate by returning skilled labor to the industries.

Very truly yours,
Roofing Crafts Institute,
Irving Payson Zinbarg,
Executive secretary.

◆

Columbus, Ohio

I am glad to note from your letter of August 24th that in your September issue it is your intention to call attention of the industry to the shortage of good sheet metal mechanics posted enough to fill the need of such men in our industry. I do not think there is any question but what such a shortage exists because I have heard it frequently, and the situation is complicated by the fact that furnace installations are in many cases in fact, most instances, more elaborate than in years gone by. Then, again, there is a heavy demand for new installations and replacements. Anyone needing a new furnace or a replacement will be very wise to order the same with the least possible delay because a good many of those who put off buying until the weather turns cool will find they cannot secure the prompt service they really need. While this is not the fault of the industry still it reflects on it a little.

I have been making numerous inquiries of our members as to the situation and while they seem to have men for work in their own shops as manufacturers they have generally reported that the heating contractors are needing or will need this Fall, more, competent men.

Our people are apprenticing some new men and can do so because such help is working under immediate direction of a foreman, but it is the men on installations who are needed most.

We do not have any trade schools in our neighborhood in this line.

In the Columbus area which is distinctly a warm air territory, I have been told there are as many as 20,000 furnace plants needing attention, and there are a lot of others that are in good physical condition which should be modernized. Of course, all of this work will not be done at once, but it indicates the potential market and is quite indicative of the condition the country over.

Yours sincerely,
Allen W. Williams,
Managing Director, Nat'l Warm Air Heating & Air Conditioning Assn.

◆

Peru, Ill.

I think that mechanic shortage is a very important question at this time, as something must be done at once to assist the employer of sheet metal men to secure more men for the rush of this fall sheet metal and furnace installations.

In my case our foreman and mechanic became ill early in spring and it appears that he will not be able to work any for the remainder of the year. I have at present one other mechanic and I could use three more men with the amount of work which I have planned for, but I know that the proper help will be hard to find.

Some of this work the other shops will get or be cancelled.

On August 1, I started an apprentice, the first one in about seven years. He is going to be a great help to our mechanic.

Last year there were eighteen members in the union local and today there are seven left. Several have left our cities and are working elsewhere. One mechanic has become our Postmaster here in Peru. The last year three shops have closed their places of business.

In the average shop of today the employer should have at least four mechanics to make the business pay—one man as a good shop man, another man and a helper installing and repairing furnaces, one for air conditioning and ventilating work, one for outside guttering and repairing small jobs, which you cannot escape.

The only assistance we have in our cities is our high school where they teach some sheet metal work such as making small gadgets.

I think and suggest that something be done at once. I know that our present state sheet metal contractors' association has not sufficient funds to do very much for this cause, not unless the new 1937 dues are increased.

I also suggest that the manufacturers of sheet metal products come to the rescue by helping to make more and better mechanics.

All other employers are in the same position that I am in, our local certainly favors and suggests the apprentice idea.

Yours truly,
C. G. Soedler, Secretary.
Sheet Metal Contractors Ass'n of La Salle and Peru, Ill.

◆

New Jersey

In this localty there is a noticeable shortage of mechanics and of sheet metal contractors who are capable of producing real residential air conditioning installations at prices prevailing among the better contractors. Many of our contractors seem incapable of estimating. They have no real method of calculating their labor costs, metal costs, and additional equipment costs. They seem to take pot luck on a very vague group of figures and hope that they come out on the right side of the ledger. It seems to be a common practice to ask for extras which is something that is not conducive to good business.

We personally believe that a method such as measuring the amount of duct work to be installed according to the square feet, figuring the cost of metal plus additional items such as labor, screws, dampers, and insulation per square foot and making one base figure of so much per square foot of duct would be the best possible method. We find, however, that three-quarters of the sheet metal contractors have absolutely no idea of the cost of various operations in their shop in connection with manufacturing duct work, register boxes, elbows, angles, "S" slips, Pittsburgh seams and the like.

For rough estimating purposes, we have been suggesting the use of the outlet system, namely prices anywhere between $16 and $20 per opening for a register or grille. We find, however, that this method is quite inaccurate and can only be used to advantage on small jobs with very little trunk line work or on large jobs having a very great number of risers and a small amount of trunk line duct, and only by very experienced contractors.

We do not believe that the members of our association or the remainder of the local sheet metal contractors have been doing much regarding the apprenticeship of young men to the field. We have several trade schools in this vicinity, but to date we have not noticed any beneficial effect from sheet metal courses.

We also find that most contractors are unfamiliar with the setting up of air conditioning equipment. We feel that their attitude in desiring to have someone else do this work is incorrect because they not only lose the opportunity of familiarizing themselves with all the various types of air conditioning equipment, but also lose profits by the introduction of outside labor to set the unit and to make necessary plumbing and electrical connections. At the present stage of progress in this industry we feel that this point is quite detrimental to sales. We notice that plumbers set steam boilers, that electricians hang metal fixtures besides connecting up the wiring and we cannot see any reason for the attitude of numerous sheet metal contractors on this point.

You will realize that a number of these viewpoints are, of course, personal. However, we contact quite a number of the representatives of the air conditioning industry in the sheet metal contracting field almost daily and we have developed these thoughts from actual experiences found in the field.

Very truly yours,
Air Conditioners Association of New Jersey.
Robert A. Mager, Secretary.

◆

New York City

Negotiations for a new working agreement have just been completed.

I am pleased to advise that the apprenticeship system, in successful operation for many years, though temporarily modified during the years of business stress, is to be restored. This will make it possible to overcome any shortage of skilled mechanics now troubling the industry.

We are fortunate in having the New York Trade School and a large number of sheet metal classes placed at our disposal by the public school system of this city, which enables us to provide excellent instruction in all phases of practical sheet metal work. The Board of Education of this city has been exceptionally helpful in meeting all of our requirements for the development of skilled mechanics.

You probably know that a large number of our mechanics were forced to engage in other fields of endeavor during the past few years. I should suggest that employer associations and sheet metal workers' unions engage in advertising campaigns to invite former sheet metal workers to return to the craft. This procedure would produce all the sheet metal mechanics needed to make up the present shortage.

Very truly yours,
Herman Weinberger,
Secretary, Employers Ass'n of Roofers and Sheet Metal Workers of Greater New York.

◆

Indiana

The situation has been more or less acute in many places in Indiana for perhaps a year past. Indianapolis seemed to lag behind most of the state in business pick-up and up to a matter of three months ago non-union shops in Indianapolis seemed to be having no difficulty in getting all of the mechanics they needed, although even at that time there was some shortage among the union shops. The situation in Indianapolis, however, was due primarily to business increase. The Technical High School in Indianapolis has had a continuous course in sheet metal work for some years and there seemed to be no shortage of apprentices in this locality.

In many places outside of Indianapolis the shortage of mechanics is due to the hiring of these men by industries. These men seem to be satisfied with the steadier work at somewhat lower wages offered them by the factories, and they are not coming back to the sheet metal business as universally as might be desired. This situation has brought about an increase in the practice of certain contractors of hiring mechanics away from their competitors. This, of course, makes for a breakdown in the satisfactory relationship between contractors, which our association has worked so hard to build up. We are doing all we can to discourage this practice.

We have for some years maintained a sort of employment agency in the Central Office. We have not to date done anything more than the two things outlined above.

Very truly yours,
Paul R. Jordan,
Executive Secretary, Sheet Metal & Warm Air Heating Contractors Ass'n of Indiana.

(*Continued on page 99*)

3 CLEANING SERVICES

1 CLEANING FURNACES
1. Take down smoke pipe, clean and put same up again.
2. Clean radiator.
3. Take all ashes out of furnace above grate.
For this service we charge from $3.00 to $5.00.

2 CLEANING WARM AND COLD AIR PIPES
1. Open furnace casing and carefully examine all castings.
2. Clean warm air pipes and registers.
3. Clean cold air pipes and registers.
4. Clean dust off top of pipes in basement.
5. Paint front of furnace black.
For cleaning warm air pipes we charge from 50 cents to 75 cents each.
For cleaning cold air pipes we charge from $1.00 to $2.00 each.

3 RESETTING YOUR FURNACE
1. Take down and clean smoke pipe.
2. Remove casings from furnace.
3. Take down and clean all castings.
4. Reset castings.
5. Replace hood and tighten.
6. Inspect casing top and all connections.
7. Reconnect smoke pipe.
8. Replace paper where torn or loose.
9. Clean up after work is completed.
For this service we charge from $8.00 to $20.00.

PHONE DREXEL 2773 OR 2774

HOMER SELCH
GUTTERS, SPOUTS, FURNACE REPAIRING
844 Virginia Avenue

The Basement of "Your Home" deserves Thorough Cleaning as done by SELCH

"Let Us Do Your Dirty Work"

And Here's the CLEANER that thoroughly Cleans

FREE!
FURNACE INSPECTION
Entirely Free of Charge We Agree to:
1. (a) Inspect your furnace castings.
(b) Inspect cleanout door frames and feed section door frames to see if they are cemented good.
(c) Inspect smoke pipe.
2. Render a report of existing conditions.
3. Give free consultation upon any heating difficulty you may have.

HOMER SELCH FURNACE VACUUM CLEANER
WE REPAIR ALL MAKES

The thoroughness of this machine can be proven to your satisfaction

There Is Danger in Defective Furnaces

FIRES often start from leaky connections. HEALTH is imperiled by a furnace that fails to give proper heat or that leaks dangerous gases into the air you breathe. MONEY is wasted in fuel that only sends heat up the chimney with a defective furnace. DIRT fills the house and makes housekeeping an endless task when the furnace is out of repair.

Save Fuel, Protect Your Health, Make Your Furnace Last Longer, and Have a Cleaner Home by Having Your Furnace Cleaned by Us

HOUSE CLEANING SHOULD START IN THE BASEMENT

At the left is the back and front of the four-page folder. At the right are the two inside facing pages showing the cleaning truck and telling about the free inspection. The three services itemized are a feature of this year's campaign.

5,000 Cleaning Cards; 500 Inquiries; 200 Cleanings; 10 Repair Jobs

The title above briefly gives the results of a furnace cleaning campaign sponsored by Homer Selch in Indianapolis, Indiana. To point out an interesting fact, it may be said that Indianapolis is probably one of the most cleaned cities in the country. The results are, therefore, considered satisfactory.

IN the city of Indianapolis, Indiana, it is probable that Mr. and Mrs. Average Homeowner have been solicited by every possible type of furnace cleaning campaign. A natural question then is—"If this is so, what sort of a campaign can be depended upon to get business?"

The answer may be found in the 1936 spring campaign of Homer Selch, one of Indianapolis' pioneer cleaning and furnace installing contractors. Homer Selch, readers may remember, ran special cleaning campaigns years ago—probably before such campaigns became national in application. Homer Selch also introduced the "Tin Shop on Wheels," using a truck completely equipped with tools and pipe to repair practically any job which came up. To operate this truck economically he devised a simple and effective routing control, also described several years ago.

Previous Efforts

In the years this contractor has been cleaning furnaces he has used practically every form of solicitation including hand bill, newspaper, direct mail, telephone, and bill board advertising. His policy has been to use each type of solicitation just as long as it brought good results and to change to another form when a change was indicated.

1936 Campaign

For the 1936 campaign a postal card, a folder and a hand bill were used. The postal card was not of the return card type as Mr. Selch believes that the return card does not bring the results expected. Instead, the card reminds the owner that cleaning is advantageous and that an order can be placed over the phone. This year some 7,000 cards were purchased. Five thousand were mailed in June and 2,000 in July. In July inquiries were received from about 10 per cent of the 5,000 cards mailed. Orders were not received from all the 10 per cent because as Mr. Selch says —"Too many owners are simply shopping around. They want as much as possible for as little as possible and since we try to give satisfaction we are not the cheapest. The price buyer usually buys from some one else."

S T O P
HAVE THAT WORK DONE NOW!
Gentlemen:
With Spring house-cleaning time comes the time to have the furnace, gutters and spouting, and the roofs on your properties checked over. Have the work done now and avoid the muss and rush later on.
Our repair trucks are fully stocked with the best of materials to take care of your needs quickly and economically. Our work is done by men who know how, the gutters are leveled so that the water drains properly and they are riveted and painted on the inside. Why not profit from the economy, speed and durability of our service NOW? We are in a position to quote you very favorable prices if you take advantage of them at once.
If you will call Drexel 2773 we will be glad to go over the properties at your convenience and give you an estimate with no obligation on your part.
Hoping to hear from you soon, we remain
Yours very truly,
HOMER SELCH SHEET METAL WORKS
SPRING
SUMMER
Time to
Save!
Have
us Clean
and Repair
your Furnace now!
We are co-operating with the Federal Housing Administration.
HOMER SELCH
SHEET METAL WORKS
844 Virginia Ave.
Indianapolis, Ind.
Phone: DREXEL 2773
CALL US FOR FURNACE CLEANING, RE-CEMENTING, AND REPAIRING
WE RECOMMEND AND INSTALL
AMERICAN Combination Furnaces
built permanently smoke and gas tight
MFD BY THE AMERICAN FURNACE & FOUNDRY CO. MILAN, MICH

Front and back of the door stuffer distributed by an agency. The text makes a bid for rain carrying equipment repair and inspection and on the other side the cleaning solicitation.

The postal cards were mailed to persons on the firm's books. During the many years Homer Selch has been in business he has built up a list of 12,000 names. These lists are revised continually weeding out poor and slow pay and those who do not pay so that the names remaining are safe and satisfactory customers.

In addition to the postal card, the city was divided up into four main districts and hand bills of the type shown were distributed by an agency. These bills were placed in the doors of the houses—not in the mail boxes. By the last of June some 6,000 hand bills had been distributed throughout the south side. This number blanketed the south side of the city. During the summer the distribution will be continued until the entire city is covered.

Service Folder

A special folder explaining the free inspection service as shown in the illustration and emphasizing the importance of having the furnace cleaned thoroughly by careful mechanics who know their work was prepared for those inquiring. The back page shows the three types of cleaning service offered and gives the price for each service. Just what is done in each service is carefully listed.

This spring the hand bill included a reminder that gutters, spouting and the roof should also be inspected and repaired and that such work, if expensive, can be handled through FHA payments.

The results of the combined postal card, hand bill and folder has been about 200 cleaning jobs, 10 completed repair jobs and 30 excellent prospects for new furnaces, new roofs, or remodeling of the heating plant to forced air, automatic firing, etc. By the end of the summer Mr. Selch expects his volume to equal that of previous good years.

The first step in Housecleaning is to
have Homer Selch VACUUM CLEAN your furnace
ADDS TO LIFE OF SYSTEM—SAVES FUEL
And Here's the CLEANER
that Really CLEANS—
Are your Gutters, Spouts and Roof ready for the spring rains?
A complete examination will be made of your Tin Work and Heating System at NO COST to you and without placing you under any obligation
STEEL AND CAST IRON FURNACES
WISE AND JEWEL
1-3 years to pay
Call HOMER SELCH Drexel 2773
844 Virginia Avenue
GUTTERING, SPOUTING
ANY MAKE FURNACE REPAIRED

This card was mailed to all good customers on the Selch books. It is not a return card, but depends on the receiver phoning Selch.

Better Weather Protection—Stucco

The recommendations presented in this series of illustrated reference sheets have been taken from various sources considered practical and authorative. This article and the facing page of details covers several common applications of stucco where flashing must be relied upon to prevent water penetration which, in stucco, is serious because water cracks stucco in freezing weather and discolors stucco all year 'round.

FREQUENTLY the sheet metal contractor finds the building he is to roof or flash or both, to be a stucco covered exterior. And lately some architects have used stucco to cover practically all exposed surfaces including the chimneys. When correctly applied there is nothing better than a good stucco surface, but when poorly applied the life of the exterior must be left in the hands of the sheet metal contractor for the flashing either makes or breaks the stucco wall.

Stucco Peculiarities

Numerous investigations have been conducted to establish the best methods of flashing stucco. The basic problem (as in other wall materials) is to keep moisture from getting behind the exterior. However, this problem is more serious with stucco than with other materials because the stucco cracks when water freezes behind the stucco shell and the result is a most unsightly wall. Carried to the extreme we have all seen stucco houses where practically an entire wall fell off (just because water got under the stucco and froze.)

The Portland Cement Association has published several detail sheets showing methods of flashing stucco which have proved satisfactory. This article and one to follow will show these recommended flashing methods.

The detail and section of the Spanish type chimney with a cap is interesting in that it shows a flashing thimble which is formed to fit into the chimney and turns out over the top far enough to carry all water well down onto the slope of the stucco top. The thimble should extend far enough into the chimney to overlap the lining and provide a flashing for the lining.

Chimneys

On stucco chimneys having a top, no flashing is required at the top, but the upper right detail shows the suggested method for flashing the base. Cap and base flashing are used as in standard practice, but rather than sink the flashing edge into the underlying masonry the cap should be extended up behind the stucco coat for several inches. The stucco which extends over the cap flashing is reinforced with mesh so that at the flashing we have a free hanging stucco shell with the flashing underneath. This type of construction makes it necessary to carry the cap flashing up beyond any possible penetration of moisture by capillary action.

The detail in the lower right shows a standard type of chimney with stone or concrete or terra cotta cap and standing on the slope of a roof. The usual type of cricket is employed to guide water to both sides of the chimney and prevent puddles and the soldered apron and base flashing also follow usual practice.

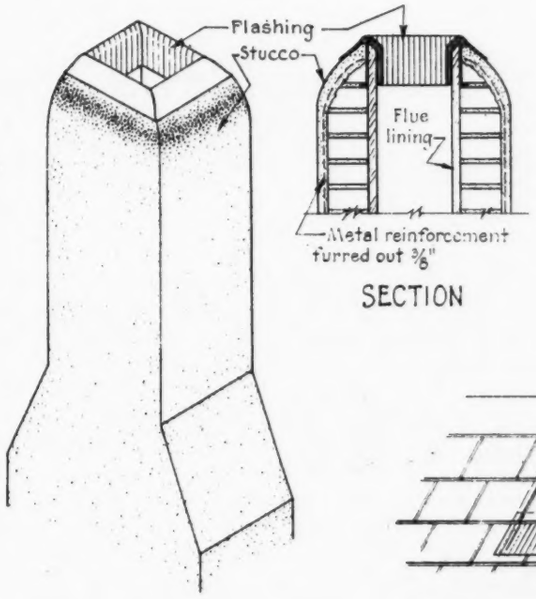
The cap flashing is stepped down the side as usual, but again it is suggested that the cap extend farther than usual up behind the stucco.

Parapet Flashing

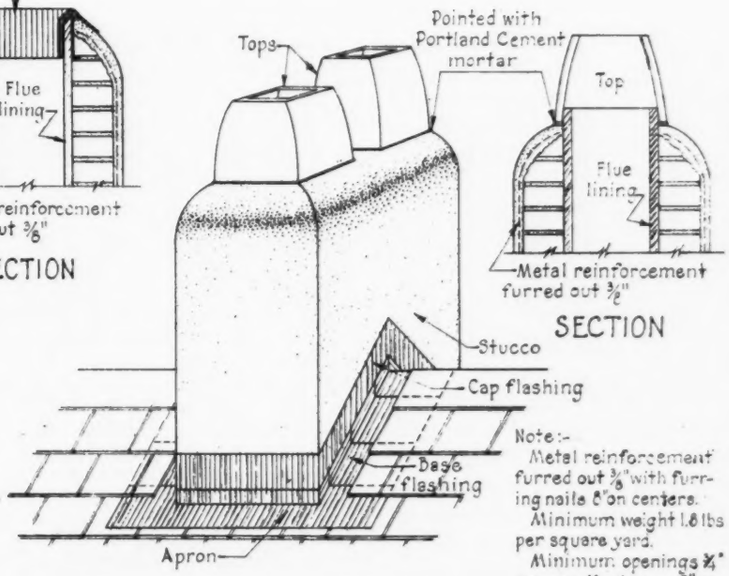
The detail in the lower left corner shows a parapet built of concrete blocks (either cinder or portland cement) over which a blanket of stucco is wrapped on metal mesh. The inside of the parapet is flashed to the roof with either a metal base and cap or a metal cap over felt on a cant board. It is suggested that the cap flashing be bent outward over an extra strip of such depth that the vertical surface of the cap flashing will form a continuous up and down line with the face of the stucco.

The reason for this is so that water flowing down the stucco continues down over the flashing without being permitted to work backward under the edge of the stucco. The cap flashing is sloped over the board to provide additional hinderance to under flowing of water.

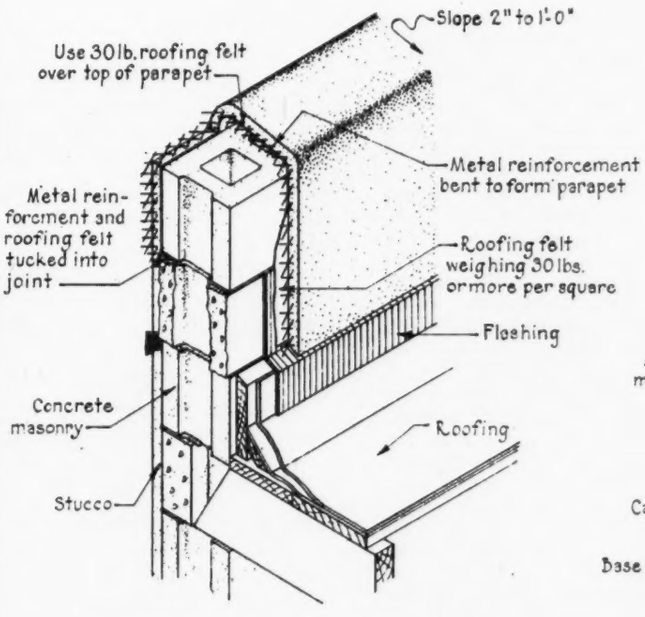
The cap flashing is carried up behind the stucco at least one block and perhaps farther if the edge of the stucco falls somewhere along the middle of a block face.



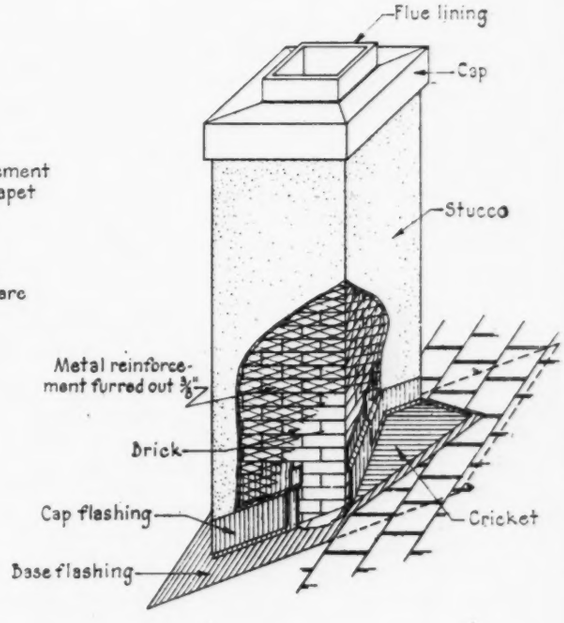
DETAIL OF SPANISH TYPE CHIMNEY WITHOUT TOP



DETAIL OF SPANISH TYPE CHIMNEY WITH TOPS


Slope 2" to 1'-0"
Use 30 lb. roofing felt over top of parapet
Metal reinforcement bent to form parapet
Metal reinforcement and roofing felt tucked into joint
Roofing felt weighing 30 lbs. or more per square
Flashing
Concrete masonry
Roofing
Stucco

DETAIL OF FLASHING ON CONCRETE MASONRY PARAPET WALLS



DETAIL OF FLASHING AROUND CHIMNEY

Details of flashing methods recommended by the Portland Cement Assn., Chicago, for various locations around and under stucco overcoatings.

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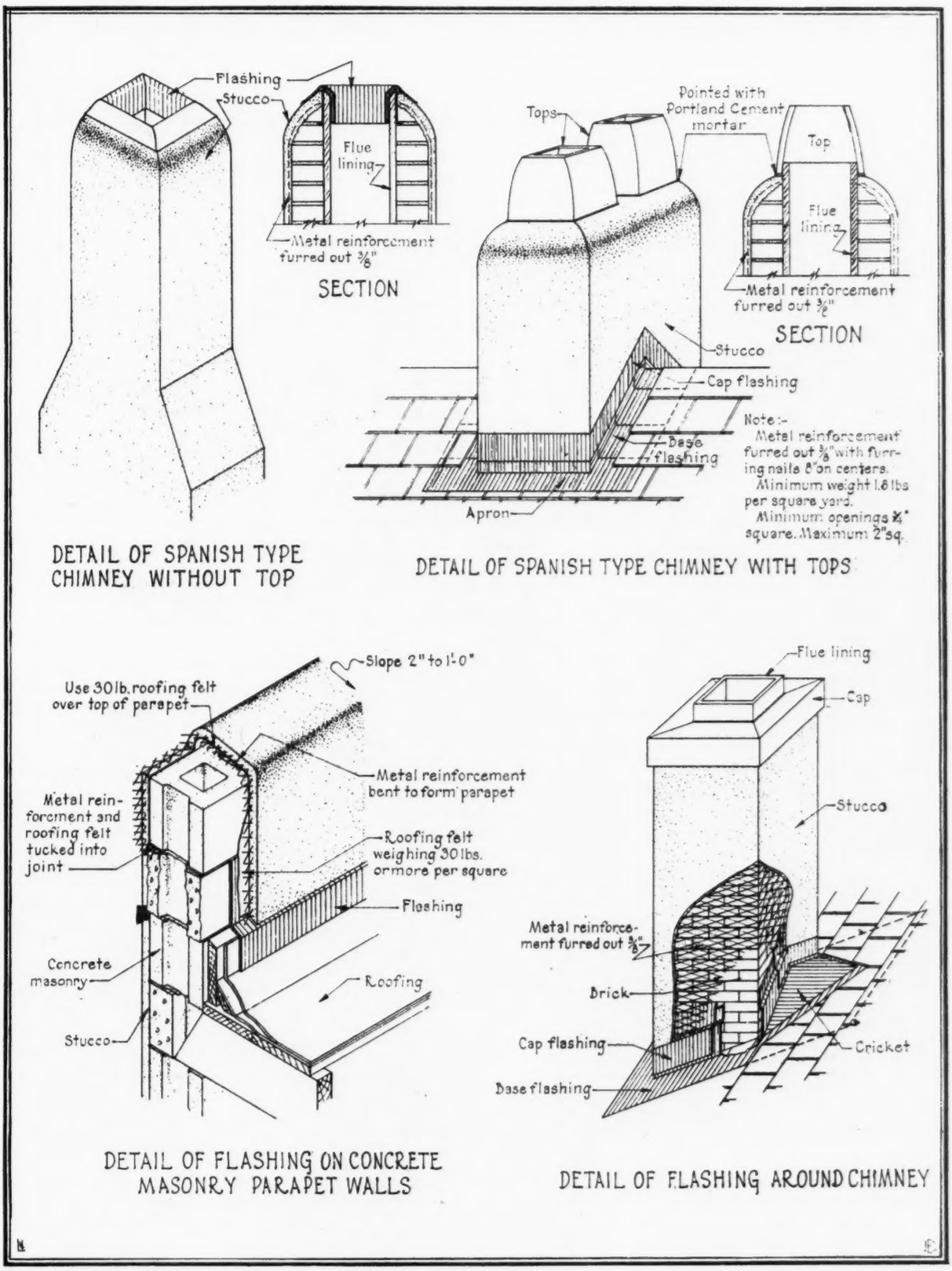

Details of flashing methods recommended by the Portland Cement Assn., Chicago, for various locations around and under stucco overcoatings.

Social Security

A Summary of Present State Laws

By Joseph G. Dingle
C. P. A., Ottawa, Ill.

IN the previous articles, the discussion has been confined to the Federal Act. In this article, we shall take up for discussion the laws passed by the several States.

Unemployment Benefits, as provided in the several State Acts, are shown in the accompanying Table I. As will be seen, the benefits in most states begin January 1, 1938. In Wisconsin the effective date is July 1, 1936. In all cases, the benefit rate is 50% of wages, subject to minimum and maximum limitations. The usual maximum is $15.00 per week, with Utah having a maximum of $18.00. Each State provides a waiting period, generally 3 or 4 weeks, with 2 weeks in Utah and 6 weeks in Washington. The average maximum duration of benefits is 15 or 16 weeks in a year.

For these benefits to unemployed employees employers in states having accepted laws will pay taxes based on wages, as is shown in Table II.

Application of Tax

Some of the States have also levied a tax on employees. No State contributes to its Unemployment Compensation Fund, but in the District of Columbia, the Federal Government contributes $100,000.00 in 1936; $125,000.00 in 1937 and $175,000.00 in 1938. In several of the State Acts, provision is made for merit rating after 1940; while other states provide rate reductions on a reserve basis.

The application of this tax on employers is governed by the number of employes. The Federal tax is on employers of 8 or more, but to be subject to the Federal tax an employer must employ 8 or more for at least twenty weeks in the year. In Table II is shown the State requirement, which in the several States, ranges from 1 or more in the District of Columbia to 8 or more. This condition makes it rather difficult for an employer to determine his liability for the tax, both Federal and State. For instance, a small shop, normally employing, say, six men, may, in Alabama, California, Massachusetts or Wisconsin, think he is not in the covered, or taxable class. He cannot be positive of this, however, until at least 33 weeks of the year have elapsed (35 weeks in Wisconsin).

An Example

Let's assume that the shop has managed to get along with six employes from January 1st, 1936, to the latter part of July, then due to increased business, it become necessary that two more men be employed. If this condition should continue for 20 weeks (18 weeks in Wisconsin) the employer then becomes an "Employer of 8 or more" and as such is subject to the tax, both Federal and State, on all wages paid during the year.

In the States of New Hampshire, New York, Oregon, Utah and Washington, the State tax applies to employers of 4 or more, with varying periods ranging from 13 to 20 weeks. In these States, an employer of more than 4 but less than 8 would be subject to the State tax, but exempt from the Federal tax. But, should an increased business require an increase in employes to 8 or more, then the Federal tax attaches to the total pay roll for the year.

On the other hand, if an employer of 8 or more were to sell out, or close his shop before 20 weeks of the year had elapsed, then, not being an "employer of 8 or more" for 20 weeks, he would not be subject to the tax.

In the Federal Act, every dollar of salaries and wages paid is subject to tax if the employer is an "employer of 8 or more," as defined in the Act. In some State Acts, salaries or wages of $50.00 per week or more paid to

Mr. Jos. D. Wilder, Editor
American Artisan

Dear Mr. Wilder: In reply to the letter from Mr. Robert Huse, Associate Director, In Charge Business Information Service, Social Security Board, Washington, criticising several statements appearing in my article on Social Security as published in your June issue, my statement was:

"Unusual because the Federal Government tells the several States that they must pass certain laws; must levy certain minimum taxes; that after these taxes have been collected they must be sent to Washington where the money may be safely kept, and after proper approval by the Federal Social Security Board, it may be sent back to the States to be disbursed."

Mr. Huse says, "The Act carries no such requirements." If Mr. Huse will read my article again I think he will find that I made no statement that the "Act" contains such provisions as he takes exception to. I said the "Federal Government tells the States...."

Sections 902 and 903, of the Act, detail the requirement that taxpayers' credit of not more than 90 per cent of his Federal tax, imposed under Section 901, shall be allowed only for contributions made under laws of States certified for the taxable year as provided in Section 903. In Section 903, rather detailed specifications which State laws must meet before the Social Security Board will approve and certify the State Act, are given.

If, then, the States must enact Washington approved Social Security Acts and have them approved by the Social Security Board before the citizens of the State may benefit from Federal funds, or, as is the case of unemployment compensation, employers must pay 100 per cent of the Federal tax and employes get no benefits, unless and until the State meets the Social Security Board's requirements. If the State enacts an unemployment compensation law acceptable to Washington, the employer pays only 1/10 of the Federal tax otherwise payable (provided his State tax equals or exceeds 90 per cent of his Federal tax). The Act does not, in so many words, say the State must pass certain laws. It does, however, penalize the citizens of the State for failure to adopt such laws.

Again, Mr. Huse might recognize the great discretionary powers given

(*Letter continued on page 22*)

TABLE I
COMPARATIVE SUMMARY OF STATE UNEMPLOYMENT COMPENSATION ACTS

States	Benefits to Begin	Rate % of Wages	Weekly Benefits		Waiting Period	Ratio of Benefit Week to Duration of Previous Employment		Maximum Duration of Benefits
			Minimum	Maximum		Ordinary	Additional	
Alabama	1-1-38	50%	None	$15.00	3 weeks in 52	1 to 4 within 104 weeks	1 to 20 within 260 weeks	16 weeks in 52
California	1-1-38	50%	$7.00	$15.00	4 weeks in 12 mo. through 1938-39. Thereafter 3 weeks in 12 mo.	1 to 4	No provision	For 52 weeks of contributions 13 weeks of benefit in 12 mo. for 104 weeks of contributions 20 weeks in 12 mo.
District of Columbia	1-2-38	40% plus 10% for dependent spouse, plus 5% for each dependent relative. Maximum 65%	None	$15.00	3 weeks in 52	1 to 3 within 104 weeks	1 to 20 within 260 weeks	16 weeks in 52
Indiana	4-1-38	50%	$5.00 per week or ¾ of wages, whichever is less.	$15.00	2 weeks total or partial within 13 weeks	1 to 4 within 104 weeks	No provision	15 weeks within 52 weeks
Massachusetts	1-1-38	50%	$5.00	$15.00	4 weeks in 52	1 to 4 within 104 weeks	1 to 18 within 6 yrs. Thereafter 1 to 26 for which employer contributed	16 weeks in 52
Mississippi	4-1-38	50%	None	$15.00	2 weeks within 13 weeks. Partial benefits, no waiting period	1 to 4 within 104 weeks	1 to 20 within 260 weeks	12 weeks within 52 weeks
New Hampshire	1-1-38	50%	If wages $10 or less 70% of wages not to exceed $5.00	$15.00	3 weeks	1 to 4 within 104 weeks	1 to 24 within 6 yrs. (Maximum duration 10 weeks)	16 weeks in 52
New York	1-1-38	50%	$5.00	$15.00	3 weeks but not more than 5 in calendar year	1 to 15 days within 52 weeks	No provision	16 weeks in 52
Oregon	1-2-38	50%	$7.00	$15.00	3 weeks in 52	1 to 4 within 104 weeks	No provision	15 weeks in 52
Rhode Island		50%	$7.50	$15.00				20 weeks within 52 weeks
Utah	1-1-38	50%	$6.00	$18.00	2 weeks within 13	1 to 3 within 52 weeks	No provision	16 weeks in 52
Washington	1-1-38	50%	None	$15.00	6 weeks in 52	1 to 4 within 104 weeks	1 to 16 within 260 weeks	15 weeks in 52
Wisconsin	7-1-36	50%	$5.00	$10 if wages less than $25; $12.50 if wages between $25 and $30; $15 if wages $30 or more	3 weeks in 52	1 to 4 within 52 weeks when benefit rate is $10 per week; 1 to 5 when $12.50; 1 to 6 when $15.00	No provision	13 weeks in 52

"non-manual employes" are excluded from the taxable pay roll. This further complicates the matter.

Under these circumstances, it is impossible to determine the tax until the year is practically over, and then only in its relation to the pay roll dollar. These pay roll taxes may not be safely added to the selling price, as usually is done with the Sales Tax. Hidden away in the Federal Act is a reference to the Revenue Act of 1926 (Sections 807 (c) and 905 (b)) which on its face is perfectly harmless, but in reality it is serious enough to warrant its being quoted here:

"Sec. 1123. Revenue Act of 1926. —Whoever in connection with the sale or lease, or offer for sale or lease, of any article, or for the purpose of making such sale or lease, makes any

statement, written or oral, (1) intended or calculated to lead any person to believe that any part of the price at which such article is sold or leased, or offered for sale or lease, consists of a tax imposed under the authority of the United States, or (2) ascribing a particular part of such price to a tax imposed under the authority of the United States, knowing that such statement is false or that the tax is not so great as the portion of such price ascribed to such tax, shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not more than $1,000.00 or by imprisonment not exceeding one year, or both."

In view of this "penalty clause" it is not wise to make any statement, either written or oral, that a selling price includes a tax for Unemployment Compensation. As discussed above, it is not ascertainable until late in the year that an employer is in fact a statutory employer of 8 or more, and to say that prices must be advanced, or have been advanced, because of the Unemployment Compensation tax, might result in a false statement. It may finally be that for any given year an employer is not subject to the Federal tax, and having, in the earlier months of the year made a statement on the subject, he might be technically guilty of a misdemeanor.

On the other hand, business men can not continue to absorb additional tax loads. It is, then, reasonable to assume that wages must be reduced to include the tax thereon, or selling prices must be increased to absorb this new element of cost. The New York Act specifically prohibits the deduction of any part of the Unemployment Compensation tax from the wages of the employe. It is believed that most employers would prefer to add the cost to the customer's bill, and, frankly, that is where it belongs. It is an added cost of the service performed for the customer and he, rather than the employe who actually performs the service for him, should pay it.

the Social Security Board, which greatly extend the scope of the actual Act. For instance, Illinois passed an Old Age Pension Law, and the Social Security Board refused to approve it. The law provided that county judges would appoint the three members of the County Commission of Public Welfare. Not until the Illinois statute was amended to place all employes of these County Commissions of Public Welfare under control of a State official did the Federal Social Security Board approve the Illinois law. Thus, to state it bluntly, in order that Illinois may receive from the Federal Government a refund of 90 per cent of the amounts paid out as old age pensions to Illinois citizens, it was necessary that all employes of the County Commissions be controlled by a State officer. This was the work of the Social Security Board, and so far as I can determine, there is no such condition set down in the Act itself.

Let's be fair and frank in discussing this so-called Social Security Act. Let's try to cause citizens, employers and employes alike to understand the benefits and penalties of this legislation.

Yours very truly,
J. G. Dingle.

TABLE II

UNEMPLOYMENT COMPENSATION
FEDERAL AND STATE PAYROLL TAX RATES
FEDERAL TAXES APPLICABLE TO EMPLOYERS OF EIGHT OR MORE

State	Employer Coverage	State Tax on Covered Employers			Federal Tax on Covered Employers			State Tax on Employees		
		1936	1937	1938	1936	1937	1938	1936	1937	1938
Alabama	8 or more within each of 20 weeks	.9%	1.8%	2.7%	1%	2%	3%	1.0%	1.0%	1.0%
California	8 or more within each of 20 weeks	.9	1.8	2.7	1	2	3	.45	.90	1.
Dist. of Columbia	1 or more	1.	2.	3.	1	2	3	none	none	none
Indiana	8 or more within each of 20 weeks	1.2	1.8	2.7	1	2	3	none	...[1]	...[2]
Louisiana	8 or more within each of 20 weeks	.9	1.8	2.7	1	2	3	none	.9	.9
Massachusetts	8 or more within each of 20 weeks	1.	2.	3.	1	2	3	none	1.	1.[3]
Mississippi	8 or more within each of 20 weeks	1.2	1.8	2.7	1	2	3	none	none	none
New Hampshire	4 or more within each of 13 weeks	1.	2.	3.	1	2	3	.5	1.	1.[4]
New York	4 or more within each of 13 weeks	1.	2.	3.	1	2	3	none	none	
Oregon	4 or more within each of 20 weeks	.9	1.8	2.7	1	2	3	none	none	none
Rhode Island	4 or more within each of 20 weeks	.9	1.8	2.7	1	2	3	none	1.	1.5
South Carolina	8 or more within each of 20 weeks	1.8	1.8	2.7	1	2	3	none	none	none[6]
Utah	4 or more	2.	2.	2.	1	2	3	none	none	none[5]
Washington	4 or more within each of 13 weeks	2.	2.	2.	1	2	3	1.	1.	1.[6]
Wisconsin	8 or more within each of 18 weeks	2.	2.	2.7	1	2	3	none	none	none

1. Indiana Law provides rate of 1.8% from April 1 to Dec. 31, 1936. Employers in 1937 and thereafter to pay 90% of employer's contribution not to exceed 1%.
2. Massachusetts—Employees to pay 50% of annual amount contributed by employer in 1938 and thereafter.
3. New Hampshire—Employer's contribution limited to 50% of Employer's contribution.
4. South Carolina—requires Employer payments to equal 90% of Federal Tax.
5. Utah requires 2% during an employer's first two years of contributions, based on reserve ratio thereafter.
6. Washington—Rate stated at 2% in 1936 and 1937 but may be 1% or 2% according to Federal Reserve Production index; 3% in 1938, 1939 and 1940; merit rating thereafter.

Federal Rates subject to reduction for amounts actually paid to State funds, limited to 90% of Federal Tax.

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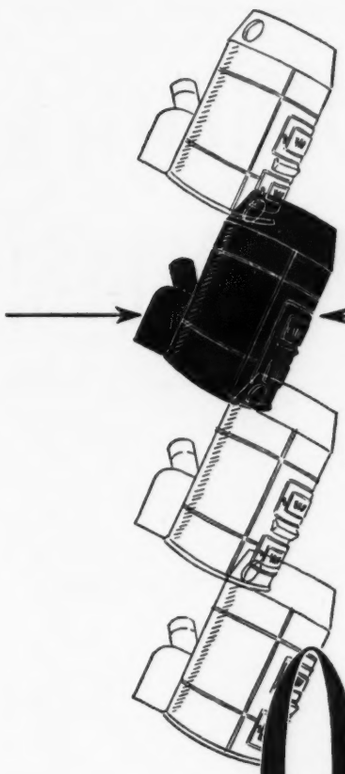

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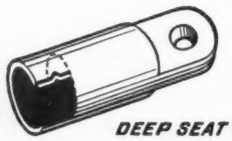

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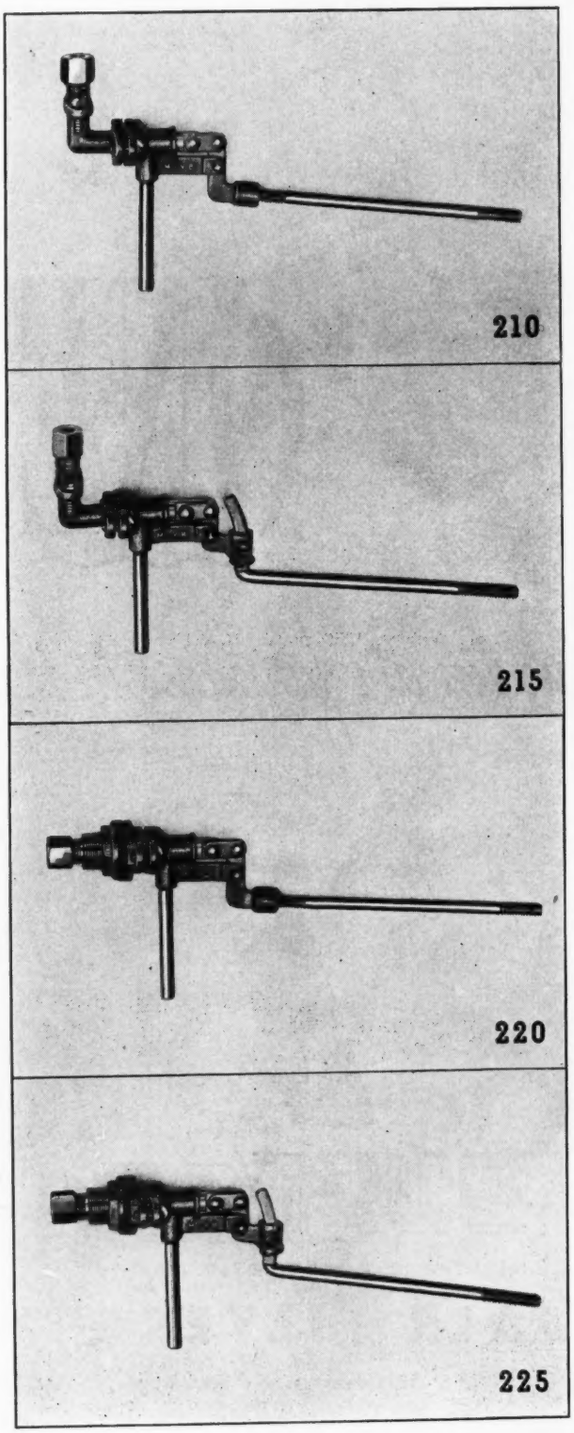

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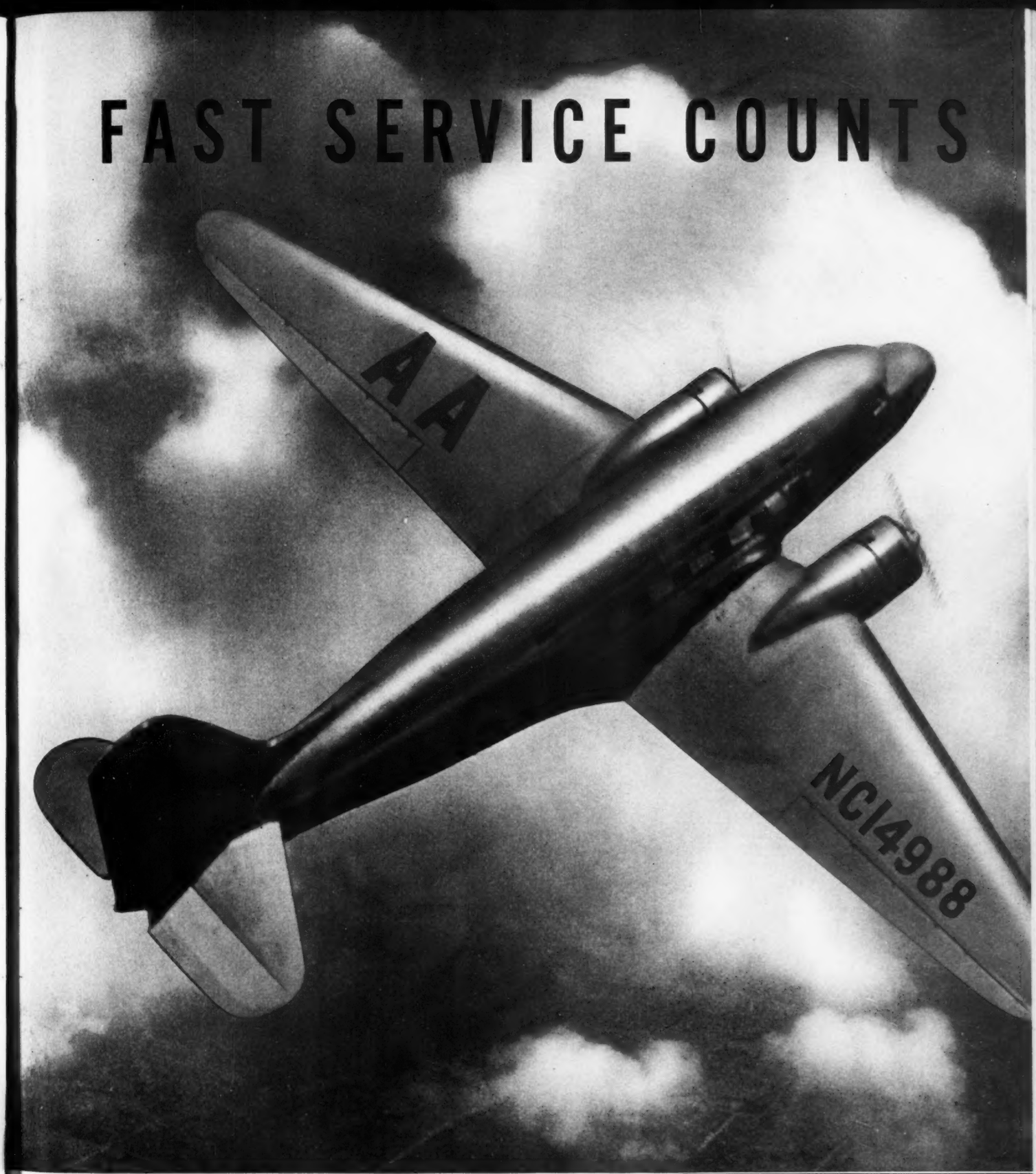

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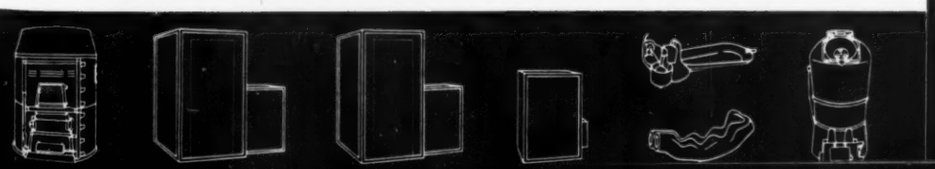

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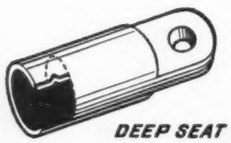

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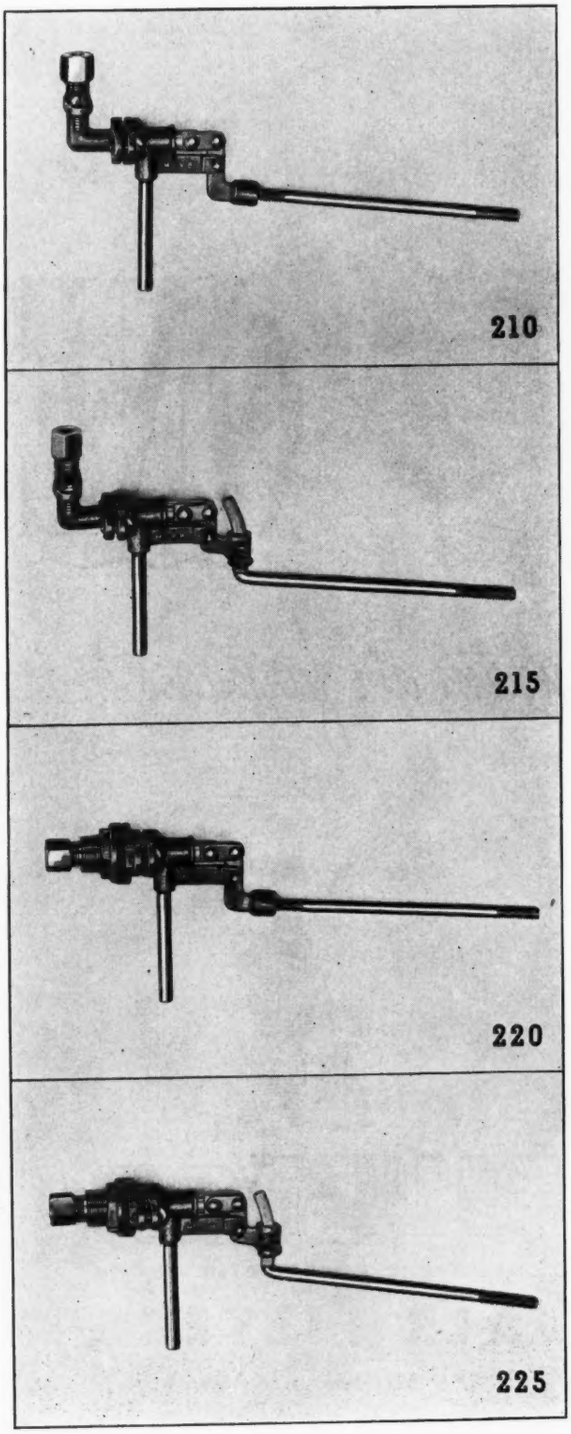

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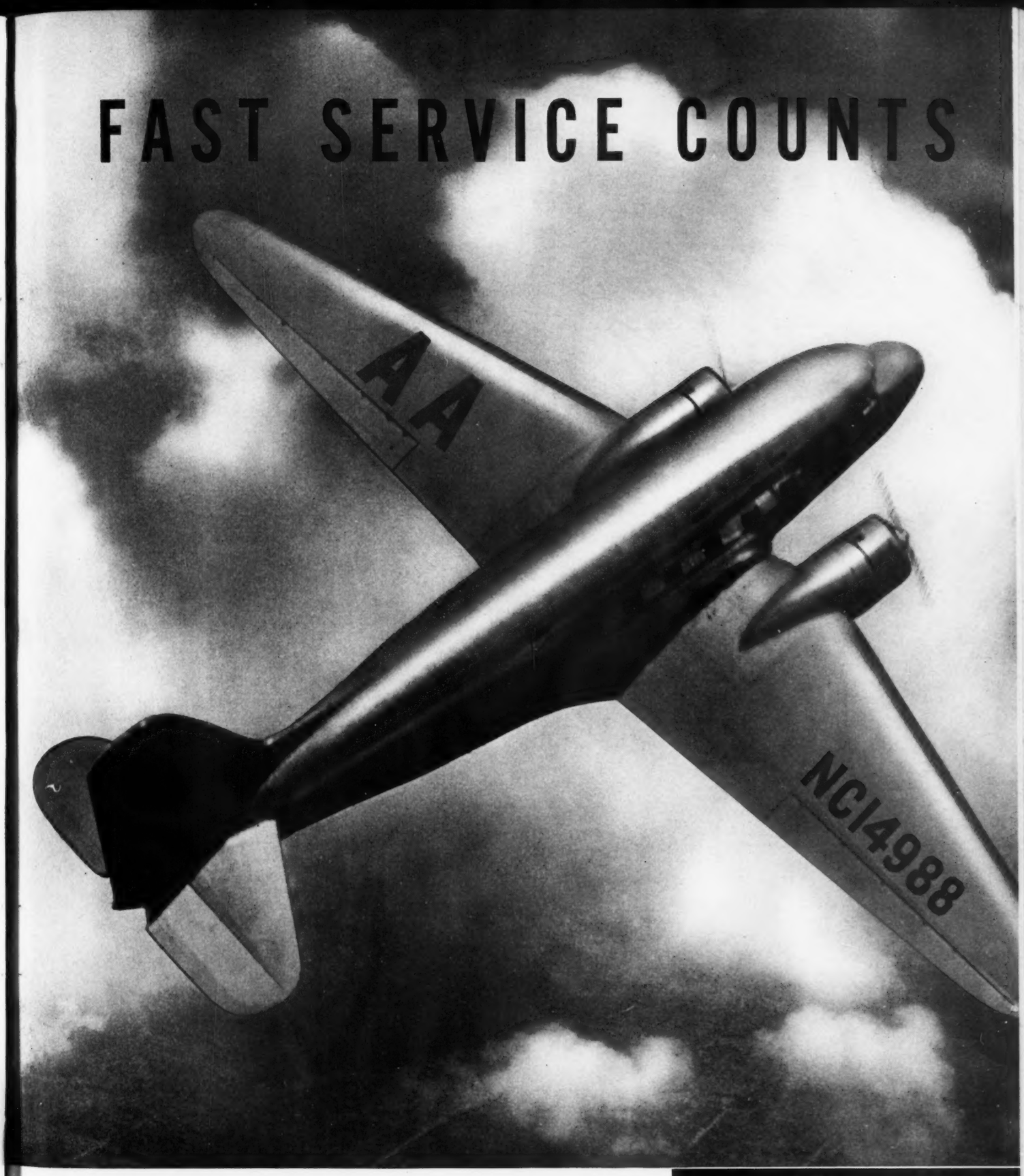

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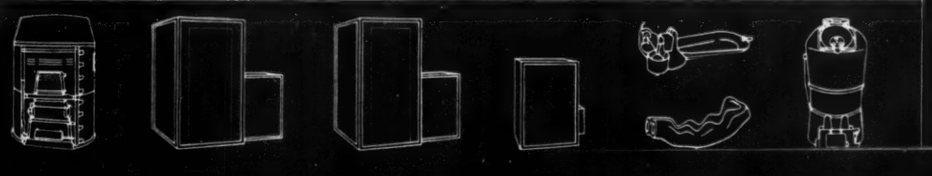

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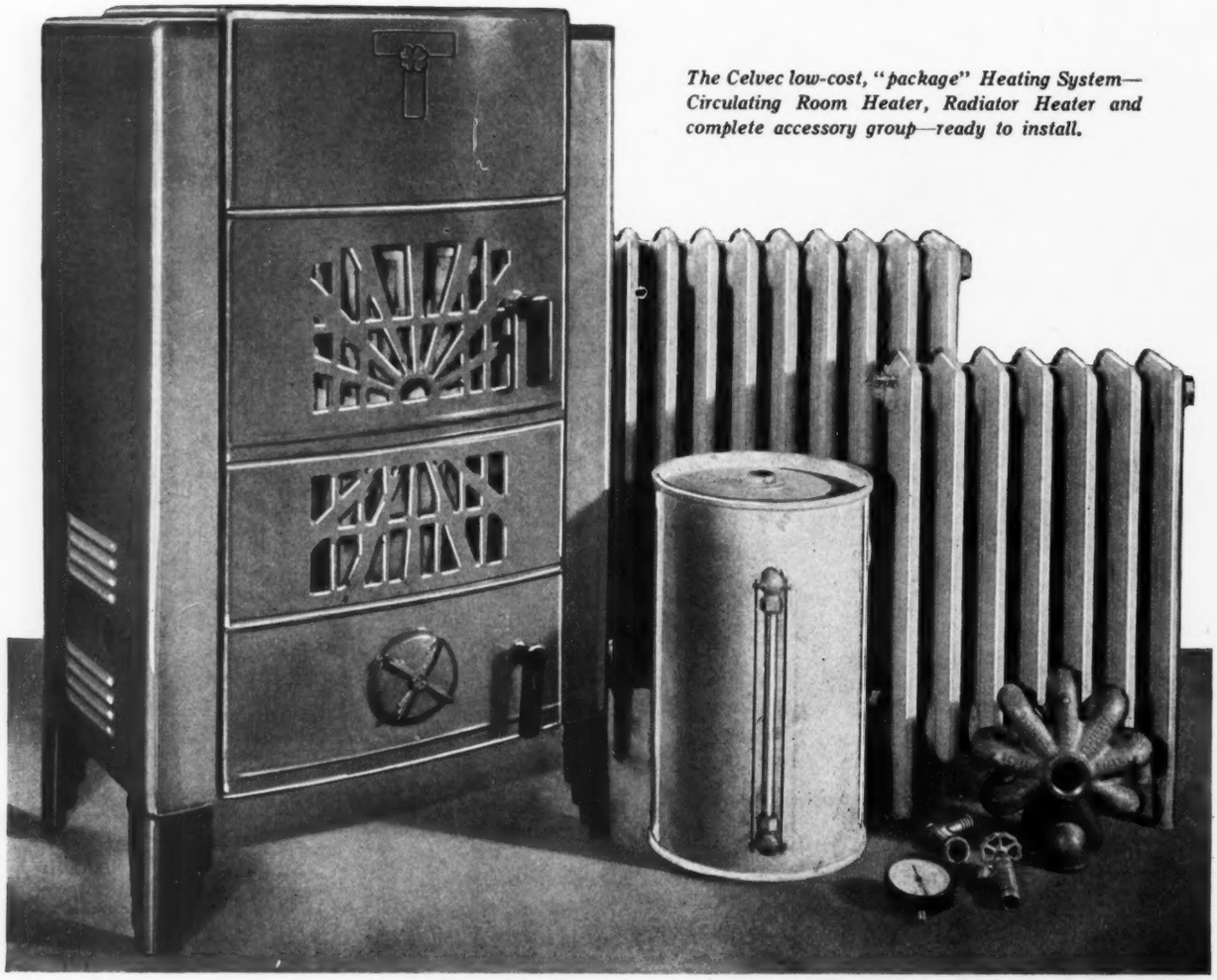
- CELVEC System is shipped complete (except pipe and fittings ready to install.



The Celvec low-cost, "package" Heating System—Circulating Room Heater, Radiator Heater and complete accessory group—ready to install.

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● CELVEC HEATING SYSTEMS open a big, wide, almost untouched field for quick money-making sales to owners of small cellarless homes and other small buildings.

Stoves are eliminated, and at a previously unheard-of low cost, radiator heat is made available to upper rooms while warm air is supplied on first floors.

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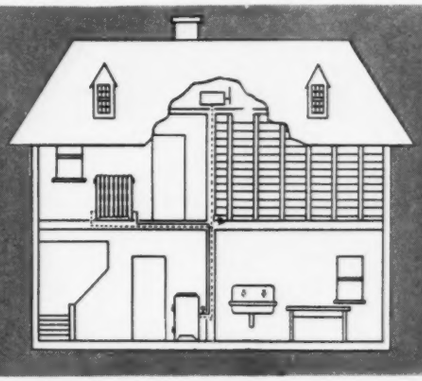

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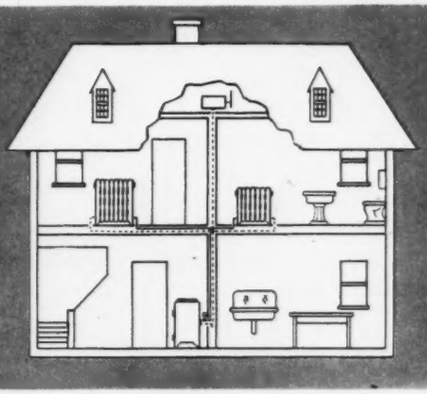

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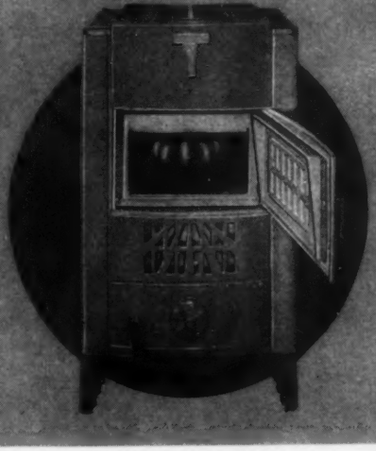
Modern Celvec Circulating Heater, two radiators (one 50 sq. ft. and one 40 sq. ft., totaling 90 sq. ft.) for second floor rooms, plus complete accessory group. Price Complete (Pipe, fittings and installation not included)..... **$111.65**



This modern Circulating Heater with Phaeton radiator heating unit is the heart of the CELVEC Heating System.

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The blower-filter cabinet can be located in the rear of the unit, as shown here, or on either side. This makes for unusual flexibility of installation. RYBOLT has equipped this unit with everything necessary to make it a real seller and offers it fully satisfied that it is a fit companion to other RYBOLT products.

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FURBLO gave the industry the first medium-priced Package Unit. Now we offer you the first compact job at a sensationally low popular price.

It's FURBLO built; FURBLO guaranteed as to quality and capacity. Priced down in the field that will help you sell a unit for every warm air furnace in your town.

Here's proof again that you can always rely on FURBLO for the quality and value that help build your business.

Capacity for up to 6-room house!

* * *

Complete with filters and furnacestat—ready to install!

* * *

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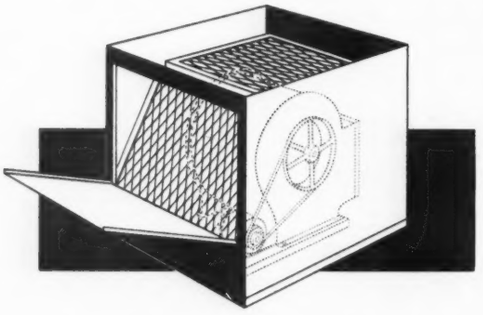
Plenty of power!

* * *

Compact, attractive, square and neat!



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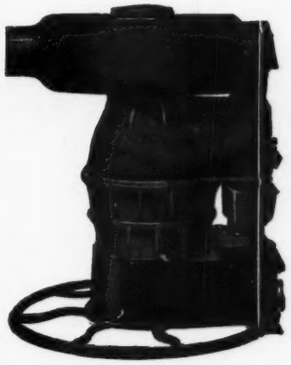

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ECONOMY
Blue Front Furnace

More ECONOMY Blue Front Furnaces have been sold so far this year than in the corresponding period of any year since the Company was organized 96 years ago. A few of the reasons are: overnight delivery from stocks in 80 principal distributing centers—largest radiator surface of all furnaces—slip fronts—one piece feed section—modernized in all respects—insures satisfactory household heating.

New cast iron air conditioner for oil only—warm air equipment for all requirements and all fuels (including wood)—also a complete line of steam and hot water boilers.

The ECONOMY *Square Cased* Furnace For Gravity and Air Conditioning

Built around the ECONOMY Blue Front is the square cased gravity and square cased air conditioning equipment. Using fully insulated 20 gauge enameled steel casings, instead of light weight black or galvanized iron, enables you to offer the builder or home owner a product that from an appearance standpoint cannot be approached. The ECONOMY Blue Front Square Cased Furnace makes an attractive appearance in any basement and has all the advantages of the Blue Front Furnace which assures efficient heating.

Built of Cast Iron—the long life metal

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PREFABRICATED DUCTS

for air conditioning work are now available in a complete range of sizes, with a definite guaranteed cost, enabling you to quote complete price installed with accuracy and without guesswork.

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NON-CORROSIVE . . . INSULATING

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For exposed or concealed installation, the efficiency of Payne "A" Vent has been definitely established. The illustrations show two difficult venting problems where Payne "A" Vent was used to replace an unsatisfactory material, absolutely eliminating difficulties with condensate.

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Many Sales . . . No Profits

If so, you know something is wrong, but perhaps you find it impossible to put your finger on an item and say "There, that's the reason!"

To avoid such an experience, get the facts about the Niagara line and Niagara's foursquare dealer policy, and you'll find you don't have to tolerate non-profitable or break-even sales.

Write today.

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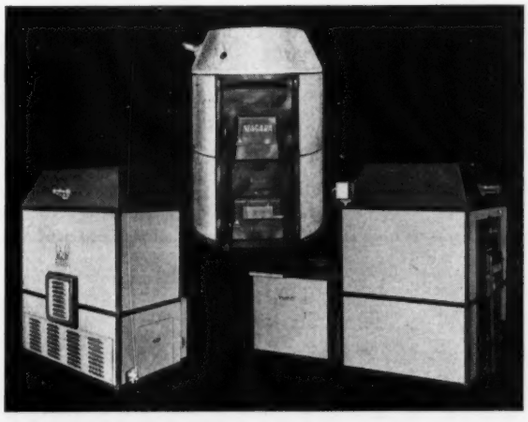

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Weeks without Food...

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But... MINUTES without AIR!

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We manufacture various lines of ventilating fans which we believe to be the best you can buy. They cost more to build than cheaper fans—and they're worth more—to the contractor and the user. Installed on your jobs, these Buffalo fans guarantee satisfactory delivery of AIR;—the one vital part of air conditioning, forced air heating or ventilating. Buffalo fans are more efficient, quiet, sturdy in construction. They deliver air up to full rated capacity. Use them with full assurance that there is nothing better on the market.

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FANS *for* Ventilating, Conditioning

Pressure Losses In Rectangular Elbows*

By R. D. Madison[1]
and J. R. Parker[2]

The authors present data on pressure losses in rectangular elbows as affected by (a) the radius ratios of the elbows, (b) the aspect ratios of the elbows, (c) angle of the bend, (d) the elbow size, (e) velocity of flow, (f) splitters in the elbows, and (g) compound elbows. In general, data are given (1) for the elbow situated in a duct system with ducts preceding and following the elbow, and (2) the elbow at the end of a duct and discharging freely into the air.

PROBABLY the earliest comprehensive tests for the determination of the pressure loss in sheet-metal elbows were made on 12-in. square and 12-in. diameter elbows of varying radii by F. L. Busey.[3] More recently Loring Wirt[4] published results of tests which included the effect of rectangular-shaped elbows. Both experimenters seem to have overlooked the fact that surface friction varies with the size and shape of the elbow and in turn has a direct bearing upon the total pressure loss. With this thought in mind the authors present the results of tests on rectangular elbows in which the effects of the size and shape of the elbow and the surface friction are considered in the determination of the pressure losses.

Definition of Terms

For the purpose of this paper, it will be convenient to refer to all elbows of the same size as having the same cross-sectional area. The velocity V through the elbow or duct will be the average velocity, i.e., the quantity of flow divided by cross-sectional area.

The radius ratio as used in the paper is designated as RR and defined as the radius of the center line of the elbow divided by the depth in the plane of the bend, i.e., divided by the difference between the outside and inside radii. In order to derive the most value from the data plotted, a new term will be used in addition to radius ratio. This term will be referred to as the curve ratio, designed as CR and defined as the inside radius of curvature divided by the outside radius of curvature. It is to be noted that in the use of the curve ratio instead of the radius ratio as a coordinate in plotting curves, (1) zero radius ratio is eliminated, (2) the curves are separated more effectively, and (3) curves can be drawn to include the complete range of radius-ratio values from 0.5 to infinity. Numerically, the following relations exist between the curve ratio and the radius ratio in this region

$$CR = \frac{RR - 0.5}{RR + 0.5} \quad \text{and} \quad RR = 0.5\left(\frac{1 + CR}{1 - CR}\right)$$

It will be observed that zero radius ratio referred to by Busey[3] does not belong to the same family of curves as those plotted using the curve ratio, the limiting condition being 0.5 radius ratio (zero curve ratio) where the inside corner of the elbow is a sharp edge and the outside radius is formed with this edge as a center.

The aspect ratio AR is the width of elbow along the axis of bend divided by the depth in the plane of the bend. High aspect ratios will therefore characterize "easy" bends and low aspect ratios will characterize "hard" bends.

The term "duct friction" will be referred to as the normal friction of straight ducts or that portion of an elbow loss which corresponds to duct friction. Similar to the losses in a duct the losses in an elbow will consist of (1) eddy loss due to the internal friction of the fluid itself and (2) film friction where the fluid is in close proximity to the surrounding walls. The eddy loss will vary substantially as the second power of the velocity while the film friction will vary as the first power of the velocity. Duct friction will, therefore, have both components and, in proportion to each, the combined loss will vary as a power, usually between 1.75 and 1.85. "Shock loss," in this connection, will be referred to as that loss over and above normal duct friction. All losses are measured as a percentage of the pressure corresponding to the mean velocity in the elbow.

Apparatus and Methods

Preliminary tests were made on elbows with cross-sectional areas of 9, 36, and 144 sq. in. by J. R. Parker[2] in his own laboratory and were checked by the coauthor in the laboratory of the Buffalo Forge Company and extended to include other sizes of elbows. It was realized that a prohibitive amount of time would be involved in making the tests unless simple procedures were employed. This is especially true in conducting tests with large-sized elbows in which a 35-

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[1]Research Engineer. Buffalo Forge Company. Mem. A.S.M.E.
[2]Engineer, Buffalo Pumps, Inc.
[3]"Loss of Pressure Due to Elbows in the Transmission of Air Through Pipes and Ducts," by F. L. Busey, Trans. American Society of Heating and Ventilating Engineers, vol. 19, 1913, p. 366.
[4]"New Data for the Design of Elbows in Duct Systems," by L. Wirt, *General Electric Review*, vol. 30, June, 1927, p. 286.
*Contributed by the Aeronautic Division and presented at the Annual Meeting of The American Society of Mechanical Engineers held in New York, N. Y., December 2 to 6, 1935.

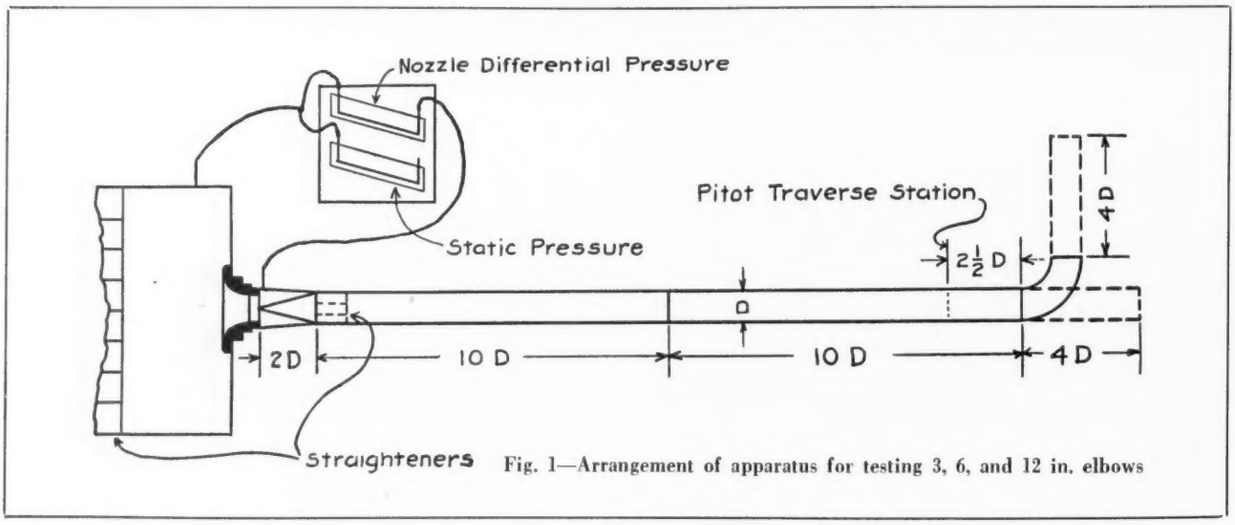


Fig. 1—Arrangement of apparatus for testing 3, 6, and 12 in. elbows

Fig. 1. Arrangement of Apparatus for Testing 3-, 6-, and 12-In. Elbows.

point traverse was made. In the early tests on small elbows the straight duct ahead of the elbow was traversed and a calibration arrived at for a pitot tube placed in the center of the duct 2½ diameters ahead of the elbow. This was later checked by the use of a calibrated nozzle as shown in Fig. 1. For the large-sized elbows, a special pitot grid was constructed. This consisted of a framework carrying 35 symmetrically placed total-pressure tips which were interconnected. Upon the same framework there were 10 static-pressure tips also interconnected. The velocity pressure thus recorded by the difference was substantially the average pressure instead of the pressure corresponding to the average velocity. This difference, however, was from 1 to 3 per cent of the velocity pressure and was substantiated by and appeared in the calibration with the standard traverse. Straighteners were used in all cases and sensitive, inclined, oil-filled manometers readable to 0.001-in. water pressure were employed.

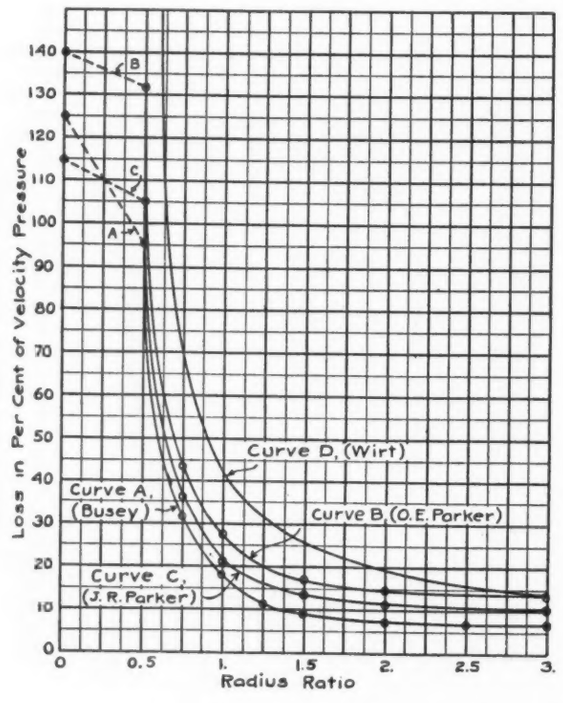


Fig. 3. Pressure Loss in 90-Deg. Elbows Followed by Ducts, Using Radius Ratios as Abscissas.

Effect of Radius Ratio

When air is discharged directly from an elbow, the velocity over the outer section is higher than normal and contains a double spiral component of motion. When the elbow is followed by a duct of 3 to 4 diameters in length, there is a partial regain in static pressure as the velocity is again lowered to normal and the spiral movement subsides. The net effect, therefore, is for the elbow loss to be lower when the elbow is followed by a straight length of duct. The pressure loss was measured by testing the standard duct with a short length (equal to four diameters of duct) attached at the end. Then a test was made at the same air velocity in the duct by interposing the elbow between the standard duct and the short length, as indicated in Fig. 1. The difference in the two static-pressure readings taken at the same point ahead of the elbow, when divided by the velocity pressure, gives the elbow loss in percentage of the velocity pressure. This procedure gives the elbow loss "followed by a duct" but does not include the duct loss of the short length itself. Where the elbow loss "only" was desired, that is, the elbow discharging into free air, the short length of duct was omitted from both tests. For square ducts, an aspect ratio of unity, the elbow was rotated to each of the four possible positions and the readings averaged. With other aspect ratios, both of the possible positions were tested and the readings averaged. Theoretically, there should be no difference in the readings when the elbows are tested in the different positions; actually, there were small differences especially when elbows of small radius ratios were not followed by a straight length of duct and also when larger-size elbows were attached to a main duct leading from a fan with the same outlet dimensions.

The effect of radius ratio may be seen by referring to Fig. 3. This is the usual plot and consists of various tests for comparison. Curve *A* is plotted from data obtained by Busey[3] on 12-in. × 12-in. elbows. Curve

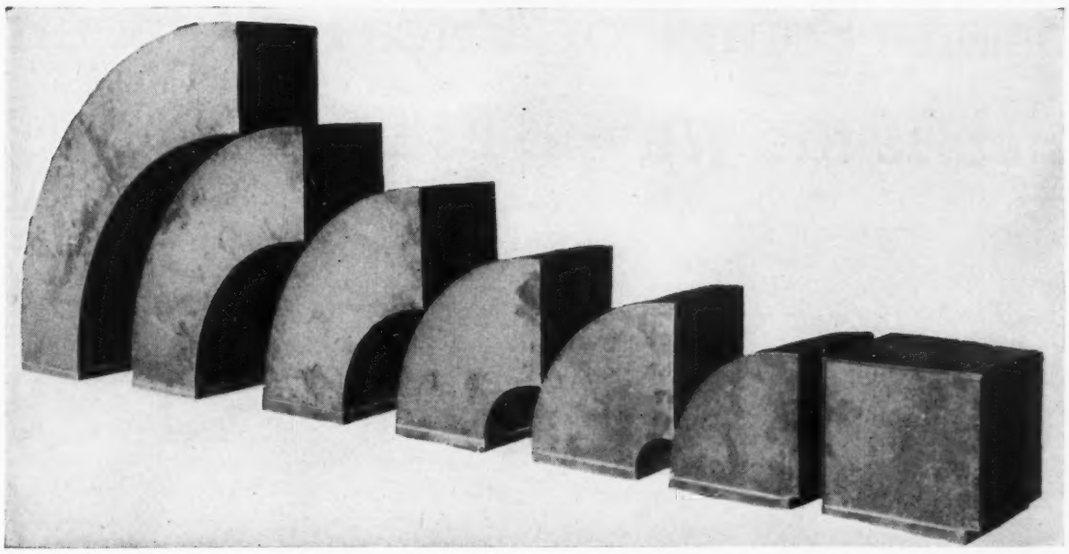


Fig. 4. Elbows of Various Radius Ratios.

B is plotted from data obtained by O. E. Parker[5] on 12-in. × 12-in. elbows. Curve *C* is plotted from data obtained by J. R. Parker,[2] during tests of identical elbows such as shown in Fig. 4. Curve *D* is plotted from data obtained by Wirt[4] on 3-in. elbows. In order to present the data in a more valuable form the curves of Fig. 3 are redrawn in Fig. 5, using the curve ratios of the elbows as the abscissas instead of the radius ratios as in Fig. 3. Additional points *E* and *F* from data obtained by Madison[1] on 12⅜-in. and 33-in. elbows, respectively, as well as point *G* from data obtained by Brown[6] on a 12-in. elbow have been added to Fig. 5. Reverse curve *H* in Fig. 5 shows the theoretical duct loss of a 12-in. × 12-in. elbow based upon a factor of one velocity-head loss in 55 diameters of straight duct, one diameter being equivalent to the side of a square duct. Note that in such a graph as Fig. 5, the extreme right abscissa which is unity represents an elbow of infinite radius and indicates that the loss in a 90-deg. elbow would be the same as in an infinite length of straight duct. The complete curve of elbow loss will, therefore, follow down along curve *C* as the radius ratio increases and then cross the space shown approximately by the dashed line and blend into the friction curve H. A value greater than 2 for a radius ratio (0.6 curve ratio) is therefore of questionable merit.

The similarity of curves *A*, *B*, and *C* in Fig. 5 probably indicates the true trend of the pressure loss.

(To Be Continued)

[5]"An Investigation of Pressure Losses in Air Duct Elbows," by O. E. Parker, presented in 1934 as a thesis for the degree of B.S. in mechanical engineering, Northeastern University.

[6]"Friction of Air in Elbows," by A. I. Brown, *Power Plant Engineering*, Vol. 36, August 15, 1932, p. 630.

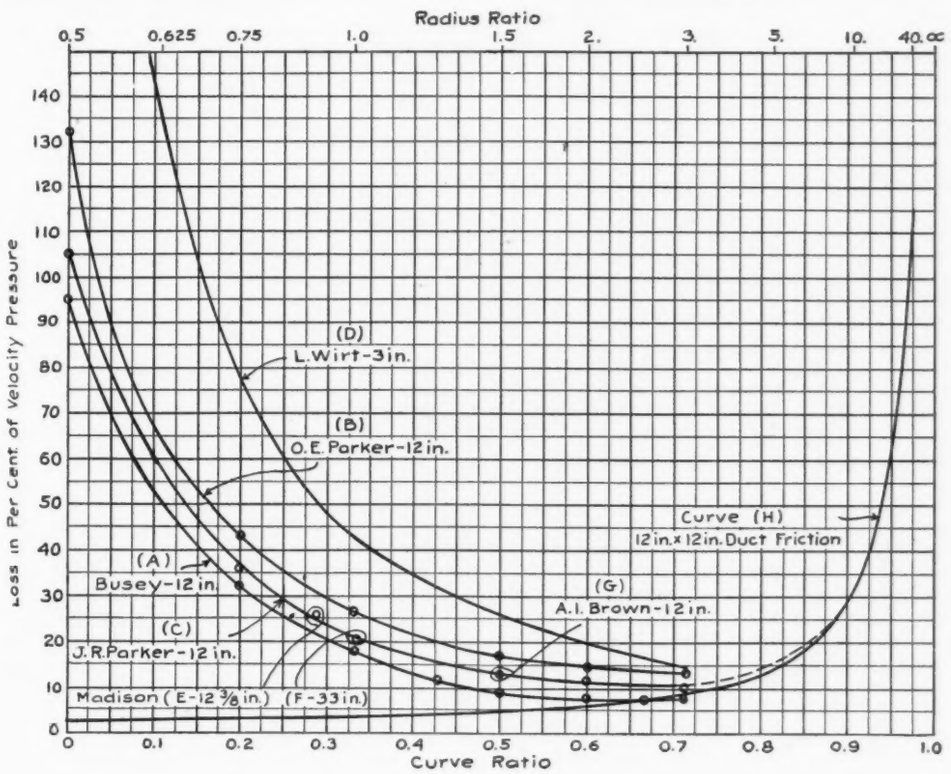


Fig. 5. Pressure Loss in 90-Deg. Elbows Followed by Ducts, Using Curve Ratios as Abscissas.

"Cost Per Pound" or "Price Per Opening" Which Is the Way to Estimate Pipe Cost

By Eugene P. Farris
Managing Director
Central Bureau for Heating and Air Conditioning, Cleveland

IN PART 2 of this discussion (August) on an accurate and *profitable* method for estimating the cost of duct work in residential air conditioning, we selected an average Cleveland residence of seven rooms and using a material quantities take-off sheet used by the members of the Cleveland Bureau, established the actual pounds of iron required for every section of ducts including the fittings, dampers, stacks, hangers plus the registers, grilles, insulation, etc.

With these actual quantities shown in our take off sheet, let us establish at Cleveland prices just how much it will cost to fabricate the metal, hang the metal, and to run risers from the basement to partition walls, so that we can establish a figure which will give a profitable bid. We will price the system shown so that we can compare our poundage method against the per opening basis for bidding.

Per Opening Prices

We shall first take the customary bidding practice of a per opening bidder. The prevailing per opening price used on new work in the city of Cleveland seems to be about $20.00. In other words, the bid usually is $20 an opening, irrespective of whether it is heat or cold. The practice is that some men use $20 an opening for the warm air side; some use $20 on the cold air; some use a differential for cold air returns.

As an example let us take $20 on both sides. This $20 an opening, includes warm air and cold air alike, is for the supplying of the metal, the development of the metal, its fabrication, its erection on the job, and does not usually include the registers and grilles, which shall be a separate item in this figure. Referring to our job on a basis per opening bid, and we find that we have twelve warm air openings and eight cold air returns, making a total of twenty openings on the job. Twenty openings at $20 an opening would be $400 for the sheet metal, exclusive of the heating units and exclusive of the registers and grilles.

The average price for the registers and grills will be about two dollars. There are twenty registers and grilles at a cost to the dealer of $2.00 per register and grill, or $40 for registers and grilles. The price of $2.00 is the actual cost of these grilles and unfortunately too many installers figure the installation at cost.

This particular job calls for a 24-inch, hand-fired, coal furnace of air conditioning design, which is commonly priced in this territory, complete with all necessary controls, such as a fan switch, a thermostat, and a limit control at a dealer's price of around $230.

Now, the per opening bidder, as a general practice, makes these particular figures his complete, all inclusive figures. The practice in Cleveland, by virtue of an agreement by the four leading furnace manufacturers, gives installers the controls for a job of this kind, installed and serviced for a period of one year by a union electrician, at a cost of $21.00, which must be added to our costs, making a total cost for bidding purposes on the per opening basis of $691.

Cost on Poundage Basis

Let us now consider our bid if figured upon a poundage basis. We have 1,265 pounds of metal. Ton buyers will buy galvanized iron at an average cost of $4.75 per hundred pounds; smaller buyers will vary from $5.50 per hundred pounds up. To be fair to ourselves we must accept the fact that a large percentage of sheet metal fabricators are men who buy not in ton lots, but in smaller poundages. Their average costs will be 5½c. If we use 5½c a pound our cost for the metal will be $69.58, an item that a great many sheet metal men never know until the job is all over. The furnace, blower and controls cost the same as before—$230 for the furnace, $21.00 for the controls and control service, $40.00 for the registers and grilles. For insulation we have 142 square feet of asbestos paper, which cost in this district around 7c per square foot, or $9.94 for insulation. We need ten locking type devices for your splitter dampers and volume dampers, and they cost in this territory 21c a piece, or $2.10. Next we have the poundage of metal to be used in the dampers—18-gauge metal for dampers instead of the customary 22, 24, and 26-gauge. We have 2 pounds of 18-gauge metal, and at 5½c a pound, we have 99c, an additional metal cost. On this installation, we will, in all probability, use at least two boxes of sheet metal screws in straps and hangers and for putting up dampers locking devices, also in assembling the plenum chamber, etc., at a cost of 50c per box or $1.00 for sheet metal screws.

We total up all of these items of actual cost to be paid out of a sheet metal man's pocket, and arrive at the total amount of cash for material necessary to do this job of $374.61.

There is a definite item of expense that must be considered no matter where or how large the shop may be. This is the item of expense for overhead, which includes insurance, light, gas, heat, depreciation

BASEMENT SUPPLY DUCTS

Items	Material	Total Quantity
PLENUM CHAMBER		
A 1—36″x30″ by 24″ high plenum chamber with solid top—1 required	22 ga. galv. seams and waste	42 lbs. net 6 lbs. 48 lbs. gross
RUN No. 1		
B 1—26″x7″ ducts—fitting—1 5′	24 ga. galv. seams and waste	31 lbs. net 5 lbs. 36 lbs. gross
C 1—9″x7″ ducts—fittings—2 21′		
C 2—4″x7″ ducts— “ —1 3′		
C 3—5″x7″ ducts— “ —1 2′		
C 4—19″x7″ ducts— “ —1 3′		
C 5—5″x7″ ducts— “ —1 2′		
C 6—15″x7″ ducts— “ —1 2′		
C 7—6″x7″ ducts— “ —2 6′		
C 8—10″x7″ ducts— “ —2 14′		
C 9—5″x7″ ducts— “ —1 2′		
C 10—6″x7″ ducts— “ —2 2′		
RUN No. 2		
D 1—19″x7″ ducts—fittings—3 14′	26 ga. galv. seams and waste	263 lbs. net 39 lbs. 302 lbs. gross
D 2—3″x7″ ducts— “ —1 2′		
D 3—17″x7″ ducts— “ —1 2′		
D 4—14″x8″ ducts— “ —1 3′		
D 5—11″x7″ ducts— “ —1 2′		
D 6—7″x7″ ducts— “ —2 4′		
D 7—5″x7″ ducts— “ —1 2′		
RUN No. 3		
E 1—5″x7″ ducts—fittings—2 8′		
RUN No. 4		
F 1—7″x7″ ducts—fittings—2 9′		

BASEMENT RETURN AIR DUCTS

Items	Material	Total Quantity
GATHERING CHAMBER		
G 1—30″x12″ by 30″ high gathering chamber with open top—1 required	22 ga. galv. seams and waste	24 lbs. net 4 lbs. 28 lbs. gross
RUN No. 1		
H 1—28″x8″ duct—fittings—1 4′	24 ga. galv. seams and waste	28 lbs. net 4 lbs. 32 lbs. gross
H 2—24″x8″ ducts—fittings—1 3′		
H 3—20″x8″ ducts— “ —1 5′		
H 4—11″x8″ ducts— “ —2 3′-2′		
H 5—14″x4″ ducts— “ —2 3′		
H 6—11″x8″ ducts— “ —1 2′		
H 7—14″x4″ ducts— “ —2 5′		
H 8—14″x8″ ducts— “ —1 1′		
H 9—14″x4″ ducts— “ —1 6′		
H10—18″ girth joist filler and ends—57′	26 ga. galv. seams and waste	300 lbs. net 45 lbs. 345 lbs. gross
RUN No. 2		
I 1—9″x13″ ducts—fittings—1 4′		
I 2—14″x8″ ducts— “ —3 12′		
I 3—4″x8″ ducts— “ —1 2′		
I 4—11″x8″ ducts— “ —1 10′		
I 5—6″x8″ ducts— “ —2 3′		
I 6—6″x8″ ducts— “ —2 9′		
I 7—18″ girth joist filler and ends—10′		
FLUE PIPE		
J 1—8″ round pipe—fittings—1 10′	24 ga. galv. seams and waste	23 lbs. net 3 lbs. 26 lbs. gross
SUPPLY RISERS		
K 1—10″x3½″ ducts—fittings—2 2′-2′		
K 2—12″x3″ ducts— “ —4 15′-11′		
K 3—12″x3½″ ducts— “ —7 11′-2′-15′-15′	26 ga. galv. seams and waste	183 lbs. net 27 lbs. 210 lbs. gross
K 4—13½″x3″ ducts— “ —2 2′-2′		
K 5—13½″x3½″ ducts— “ —1 2′		
RETURN AIR RISERS		
L 1—13½″x3″ ducts—fittings—4 10′-1′-1′-10′	26 ga. galv. seams and waste	142 lbs. net 21 lbs. 163 lbs. gross
L 2—13½″x3½″ ducts— “ —6 10′-1′-22′-1′		
HANGERS AND REINFORCING		
M 1—On all ducts		101 lbs.
DUCT INSULATION		
N 1—Use ½″ air cell asbestos on exposed ducts as shown on plans	½″ air cell	142 sq. ft. net

VOLUME OR SPLITTER DAMPERS Use locking quadrant operation		
3″x7″ damper	18 ga. galv.	1
5″x7″ dampers	“ “	3
6″x7″ dampers	“ “	2
7″x7″ dampers	“ “	2
9″x7″ damper	“ “	1
11″x7″ damper	“ “	1

GRILLES Use stamped steel of plain lattice design and prime coat finish	
14″x6″ grilles	2
14″x8″ grilles	5
30″x6″ grille	1

REGISTERS Use stamped steel of plain lattice design and prime coat finish	
10″x4″ register	1
10″x6″ register	1
12″x6″ registers	2
12″x8″ registers	4
14″x6″ register	1
14″x8″ registers	3

The quantity take-offs shown above are reproduced from a prepared Survey Sheet adopted by the Cleveland Bureau. The prepared sheet, in addition to the three columns shown, has spaces for "Detail," "Girth," "Price," "Total Cost." Each sheet measures 8½ by 14 inches.

on equipment, depreciation on your automobile, gas and oil and other items, telephone, etc. No two men seem to agree on the percentage of material cost to add for overhead, but for the purpose of this article let us say overhead costs at least 25 per cent of material cost. Twenty-five per cent of $374.61 is approximately $91.75. The job should be priced on that basis for a total of $466.36. That does not include any labor, of any kind, shape, form or description.

Up to and including this stage of our bidding on a job, we have not as yet our cost for labor. We haven't so much as put the stock into our shop; we haven't so much as moved it on to our own truck; we haven't so much as hauled it anywhere; we haven't done a blessed thing to it but just taken in bare material at a definite cost, upon which we feel we are entitled to make 25 per cent. Now let us consider this labor item.

Union labor in the city of Cleveland is costing on new house work, $1.25 per hour, plus insurance, which brings our normal operating labor cost per hour to approximately $1.35 per hour. This, in itself, is a very interesting item, but we shall accept, for the benefit of this record, that insurance is an item that should be covered in overhead, and we shall allow it to remain in overhead to justify our overhead account.

The customary price for labor in fabricating iron by experience in shops in cities like Detroit, St. Louis,

(*Continued on page* 60)

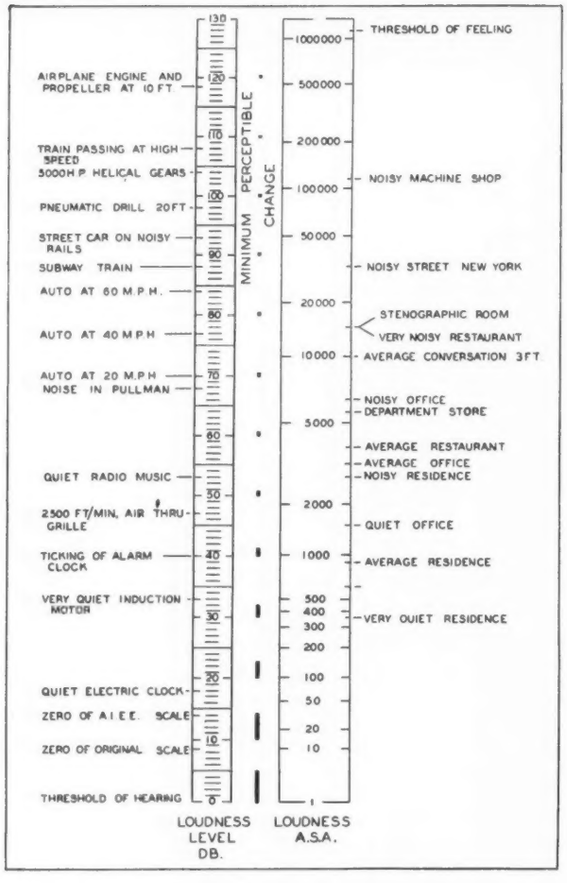


Fig. 1.—Comparison of Loudness Scales. The short line segments in the center show the smallest change in loudness which can be perceived.

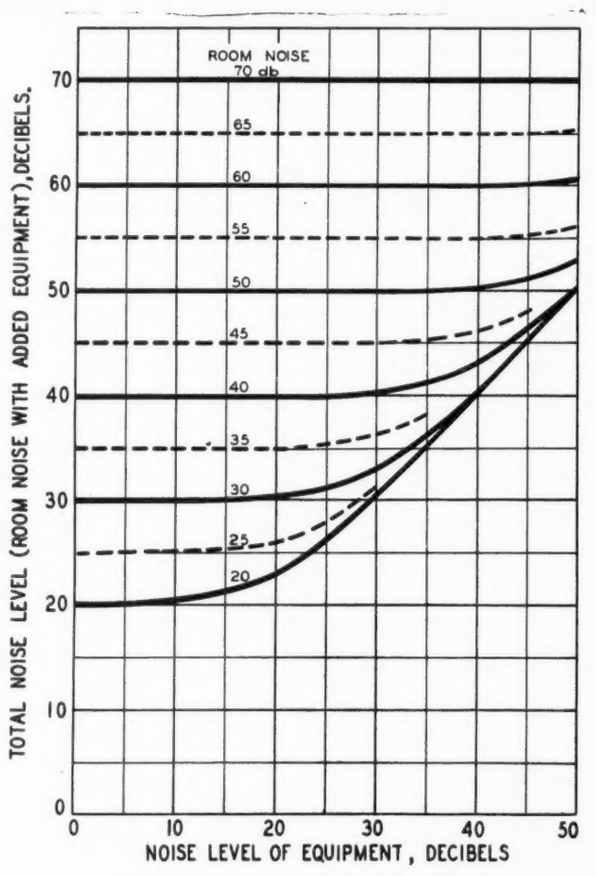


Fig. 6. Curves showing how Room Noise is increased by equipment having a known noise level.

Noise Problems of Forced Air Installations

By P. H. Geiger
Research Physicist,
Department of Engineering Research,
University of Michigan

IN THE article published last month, instructions were given for computing the loudness of the noise made by air flowing through a grille of any size and in any room. This article considers the amount of noise which is permissible in various locations. Suggestions for making quiet installations, or quieting them after they are already installed will also be given.

Permissible Grille Velocities

If the noise made by an installation is kept so low that it does not noticeably increase the noise level already existing in the room, all concerned will be satisfied. On first thought it might seem rather difficult to comply with this condition, but actually it is not, for the ear has the characteristic of hearing the loudest sounds present and neglecting sounds only slightly quieter. In other words, the noise already in a room will mask out the noise made by a machine, or other equipment, if the loudness level of the equipment is only six or seven decibels less than that of the existing sound.

The increase in loudness level of a room due to the addition of grille noise (or any other noise) is shown by Fig. 6. Suppose, for example, that a grille is to be installed in a room where the loudness level is 40 decibels and suppose that an air velocity has been chosen that will give a noise level of 35 decibels. To

In the August issue, Professor Geiger gave tables showing how noise intensities are measured and explained how noise is created. He also showed the effect of grille size and air velocity on noise intensity. The contractor, having these known factors, wants to know how to control noise. This article explains sound deadening and preventing measures.

◆ ◆

find the loudness level in the room after the installation it is only necessary to follow up the vertical line corresponding to 35 decibels on the horizontal axis, to where it meets the curve corresponding to a room noise of 40. The value of room noise with grille noise present is given as 41.6 decibels on the vertical scale. Thus it is evident that the addition of a 35-decibel noise to a 40-decibel noise increases the latter by only 1.6 decibels. Fig. 1 shows that a change of 1.6 decibels is so small that it can be detected only by careful observation.

There are some important exceptions to the rule that the addition of a noise five or ten decibels below the original noise will not perceptibly increase it. It is true that an increase in loudness of about one decibel (at the loudness levels under consideration) is not noticeable, but if the increase in loudness is brought about by the addition of a distinctive sound, such as the tone produced by a fan, the change in the character of the sound can be perceived even though there is not a perceptible increase in loudness. For this reason, if the blower possesses a distinct fan tone it will be necessary to adopt means of reducing the blower noise to a value 15 or 20 decibels below the original noise level in the room.

From the above paragraphs, it is seen why the impression is often held that there is a definite velocity at which grille noise becomes objectionable. If the velocity is slowly increased as a person listens, there will appear to be a fairly definite velocity at which the noise becomes audible. However, if the experiment is repeated in another room, or perhaps in the same room at another time, a quite different velocity may be decided upon as being objectionable. The reason for this is that the velocity determined by this experiment will be greatly influenced by the noise level already existent in the room because the noise can not be heard as long as the velocity is such that the noise is less than about five decibels below the room noise. However, as the velocity is increased only slightly above this value the noise will become easily noticeable.

If an installation is to be designed for a room whose noise level is known, or if a noise specification is supplied by the architect, the computations can be made as described in the August article. However, the contractor usually does not have this information. He will, therefore, welcome assurance that the installation will be satisfactory without being compelled to reduce the air velocities to values unnecessarily low. Table II has been prepared for use in such cases. In this table are given the velocities for several sizes of grilles for various types of rooms, which, in the writer's opinion, will be satisfactory in almost every case.

Table of Permissible Noise

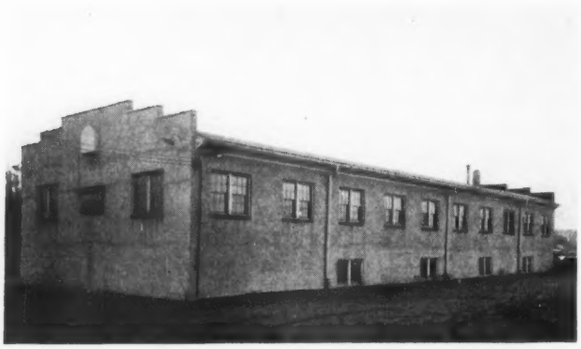
Since the noise level of any room is by no means a definite, fixed quantity and since the noise level of rooms used for the same purpose will vary from locality to locality, it is impossible to set definite figures. The figures given are conservative and should prove satisfactory in almost every instance. However, the contractor may size up the job and make corrections to fit. For example, if an air conditioning unit is to be set up in a bedroom, in a quiet suburban district and the owner makes inquiries about the noise the apparatus makes, it will probably be wise to use a velocity

(*Continued on page* 62)

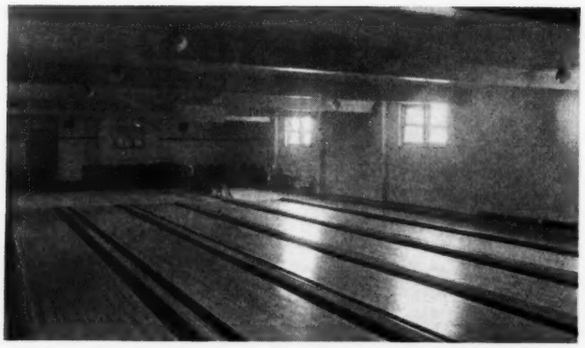
TABLE II

PERMISSIBLE VELOCITIES THROUGH GRILLES

Room	Permissible noise level (decibels)	Grille A				Grille B			
		.5 sq. ft.	1 sq. ft.	2 sq. ft.	4 sq. ft.	.5 sq. ft.	1 sq. ft.	2 sq. ft.	4 sq. ft.
Residence, living room	35	800	700	625	550	1,600	1,450	1,350	1,250
Residence, bed room	25	500	450	400	350	1,200	1,100	1,000	900
Office, quiet	40	950	850	750	700	1,900	1,700	1,550	1,400
Office, average	50	1,450	1,300	1,125	1,000	2,700	2,400	2,100	1,950
Restaurant, quiet	45	1,150	1,050	925	675	2,200	2,000	1,800	1,625
School room	50	1,450	1,300	1,125	1,000	2,700	2,400	2,100	1,950
Church	45	1,150	1,050	925	675	2,200	2,000	1,800	1,625
Theatre	45	1,150	1,050	925	675	2,200	2,000	1,800	1,625
Theatre, motion picture	55	1,800	1,600	1,400	1,200	2,900	2,700	2,500	2,300
Store, quiet	45	1,150	1,050	925	675	2,200	2,000	1,800	1,625
Hospitals	40	950	850	750	700	1,900	1,700	1,550	1,400
Broadcast Studio	15	350	300	250	200	850	750	650	500



The exterior is stucco on frame with English basement and low attic space.



Looking toward the playing end of the alleys showing "blow-in" registers and location of large return.

Winter Air Conditioning System For a Dine-Dance-Recreation Club

Floor useage and building construction in this club necessitated adoption of both "blow-in" and attic distribution. The contractor developed a plan which has satisfied the owner and furnished customer comfort with a simple, out-of-sight system.

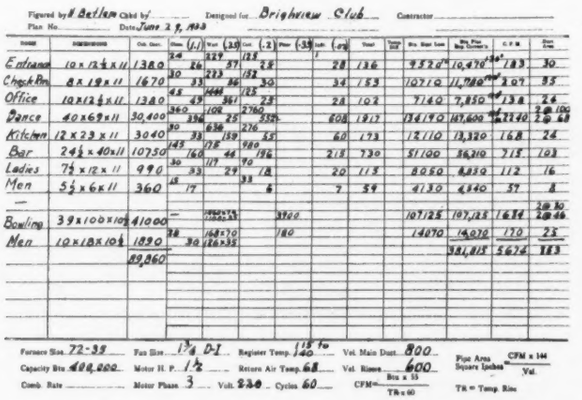
IN the heating and ventilating system installed in the Brightview Club, Rochester, N. Y., by Betlem Heating Co. of Rochester the "blow-in" method of introducing heat was used in the grade level bowling alleys and an attic distributing system with registers through the first floor ceiling was used for the dine-dance first floor. As shown in the photographs the building is stucco on wood frame figuring a total heat loss of practically 382,000 Btu.

For purposes of winter heating a furnace with a capacity of 400,000 Btu when oil fired at 4 to 5 gallons per hour consumption is used with a 6,000 foot per minute blower. The heating plant is arranged so that all outside air, all recirculated air or varying mixtures of both can be introduced to the furnace through the blower.

It was thought advisable to have as nearly constant air circulation as possible in order to capitalize on the benefit of good ventilation. By arranging the outside air intake as described and shown on the plans, all air can be recirculated when only a few guests are present, or full outside air can be used when the interior is crowded and smoky. Further, the register air temperature used for heating was purposely set at a low point—125 degrees maximum—for zero weather. For straight ventilation the same system of ducts and the same blower will give four air changes per hour which, with all outside air, was thought sufficient for ventilation, but not for any convection cooling.

The furnace and blower are located behind the bowling alleys in the basement in a small heater room. Warm air for the basement is piped two ways off the bonnet, the trunks ending in two registers,—at one side of the end wall of the alley. The initial register

Heat is supplied to the dine-dance floor from six ceiling registers connected to an attic-space, round-pipe, trunkway. The return is in the stage face.

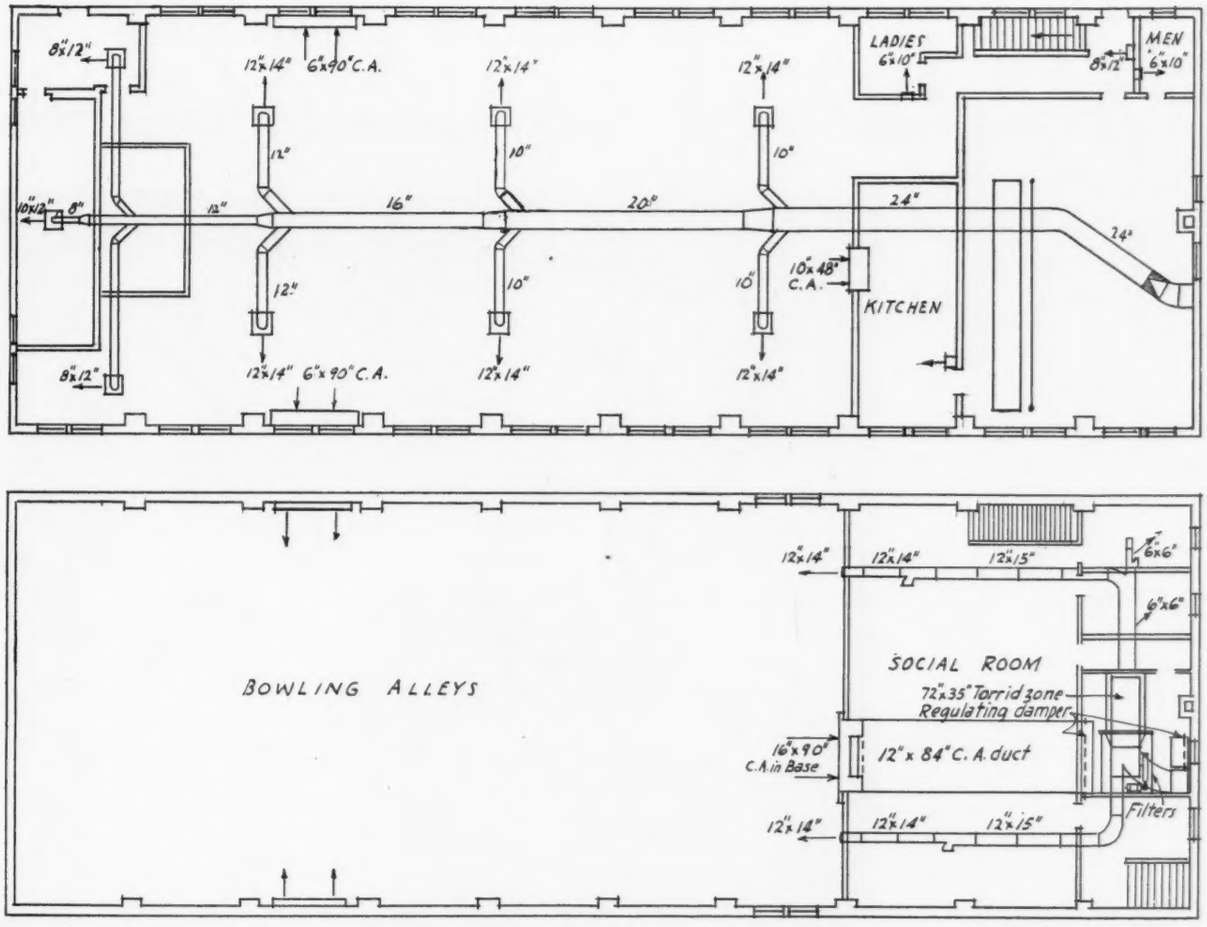


Figured by *H. Betlem* Odkd by/ ... Designed for *Brightview Club* ... Contractor ...
Plan No. ... Date *June 2 9, 1938*

Room	Dimensions	Cub. Cont.	Flow (1)	Vent (2)	Cond. (1)	Cond. (2)	Floor (-35)	Sub. (-5)	Total	Temp. Diff.	Htg. Heat Loss	Htg. Pipe Size Turbine's	C F M	Diam. Duct
Entrance	10 × 17½ × 11	1380	24 16	329 57	185	28			28	136	9520	10,470	183	30
Checkroom	8½ × 19 × 11	1670	30 33	233	132	30			34	153	10710	11,780	207	35
Office	10½ × 14½ × 11	1380	48 43	446 361	185	23			28	102	7140	7,850	138	24
Dance	40 × 69 × 11	30,400	360 336	108	2760	25			608	193	134190	147,600	2590	2 @ 10½ 2 @ 69
Kitchen	12 × 23 × 11	3040	30 33	636 159	276	55			60	173	12110	13,320	168	24
Bar	24½ × 40 × 11	10750	148 160	178 44	980	196			218	130	51100	56,210	715	103
Ladies	7½ × 12 × 11	990	30 33	117 29	90	18			20	113	8050	8,850	112	16
Men	5½ × 6 × 11	360	15 19		33	6			7	54	4130	4,540	57	8
—		—	—	[illegible]			3200				107125	107,125	1634	2 @ 30 2 @ 46
Bowling	39 × 100 × 10½	41000		[illegible]										
Men	10 × 18 × 10½	1890	28 30	168+70 126+32		180					14070	14,070	170	25
		89,860										381,815	5674	183

Furnace Size *72-33* ... Fan Size *1¾ D-I* ... Register Temp. *125 to 140* ... Vel. Main Duct *800* ... Pipe Area Square Inches = CFM x 144 / Vel.
Capacity Btu *400,000* ... Motor H. P. *½* ... Return Air Temp. *68* ... Vel. Risers *600* ... CFM = Btu x 55 / TR x 60
Comb. Rate ... Motor Phase *3* ... Volt *230* ... Cycles *60* ... TR = Temp. Rise

The data sheet shows the losses to be high for the size of the building; also the contractor's pipe size calculations.



At the top is a plan of the attic supply system for the dine-dance floor. All mains and branches are round pipe, insulated. Cold air gravity drops are indicated. Below is the basement, "blow-in" system showing where gravity drops enter the alleys; location of apparatus; simple supply and return system.

velocity of the air is around 1,000 fpm, a velocity calculated to carry the stream to the pin end of the alleys. Even if the carry should not always be so great, the patron's end of the room will be warm and ventilated.

Air from the alleys is returned through a single large grille, placed in the same wall as the registers. The plan shows that this same large duct gathers in one return from the first floor. Return air from the first floor is also vented into the alley as shown and returned to the fan by natural mixing.

Dining Room

Warm air to heat the dine-dance floor is taken off the bonnet through a single large main which changes to a riser up the end wall and turns down the length of the building in the attic space. The attic is barely high enough to take the pipe. The single large round pipe runs the length of the building ending in a three way branch—two branches serving the small office and entrance rooms and the center branch the foyer and cloak room. Round pipe branches are tapped off the trunk run as shown, turning down through ceiling registers at sixth points of the room. Rooms in the back of the building are served from branches off the basement ducts.

The small rooms of the first floor are not vented, but two large side wall return grilles in the floor permit air to flow by gravity down into the bowling alleys below and one large return air grille in the end connects into the alley return.

The data sheet shows the heat loss calculations used with the coefficients for the structural parts. The plans show the arrangement of the component parts of the system.

Equipment Specification

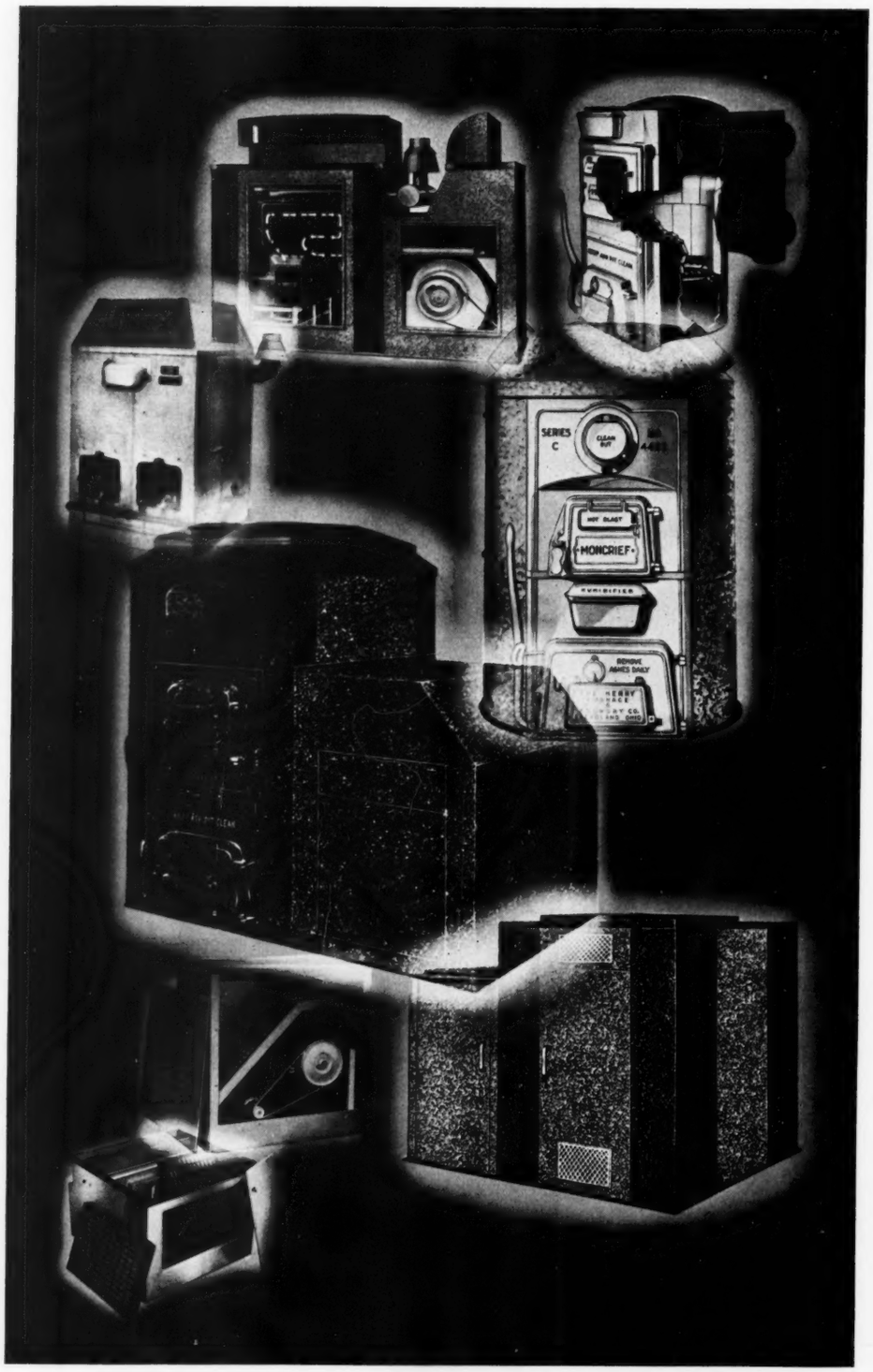
The schedule of apparatus calls for a heavy steel furnace of 40,000 Btu capacity—a rotary oil burner with a 4-5 gal. per hr. nozzle—a belted double inlet, pressure blower capable of moving 6,000 cfm against ⅝-in. of static pressure at 350 rpm and 1,000 fpm outlet velocity—an automatic humidifier and dry type filters.

Specifications called for 24-gauge galvanized iron on plenum and main ducts and 26-gauge on all small ducts and round pipe. Each branch, whether rectangular or round, has a tight fitting, lock-type damper.

An interesting feature is the means for conserving air temperature in the ducts. All pipes in the attic space are wrapped with two layers of aircell and all exposed duct work is also covered.

The contract price of the installation was $1325.00.

MONCRIEF



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Forced Air Heating Facts From the Research Residence

By S. Konzo
Special Research Associate
Engineering Experiment Station
University of Illinois

Design of Forced-Air Heating Systems (Part 4)

Introduction

IN the July, 1936, issue of this magazine the importance of estimating the heat loss from ducts and the desirability of making proper estimates of the air temperatures at each of the supply registers was emphasized. It was indicated, for example, that if the assumed temperature for the air leaving the supply registers is 135 deg. F. and the actual value is 115 deg. F., on account of the heat loss from the duct leading to the register, the actual air volume required at the supply register will be 35 per cent greater than that calculated by assuming a 135 deg. register air temperature. A value of 0.5 deg. per foot of duct was recommended for ordinary practical design.

In this article the subject of heat loss from ducts is continued and the following items will be considered:

A. Cases in which the insulation of duct is recommended:
   a. Duct in unheated space,
   b. Riser in studding space on outside wall,
   c. Long runs with low register temperature,
   d. Runs to first story rooms,
   e. Minimum duct sizes,
   f. Return ducts on outside insulated walls.

B. Comparative insulating values of various forms of duct insulation.

C. Mathematical equations for determining heat loss from ducts.

Part of the data is from Bulletins 120 and 266 of the University of Illinois Engineering Experiment Station.

A. Where Insulation Is Recommended

In the previous discussions it was shown that by estimating the heat loss from ducts or by calculating the air temperatures at each of the supply registers a closer estimate of the actual air volumes at each register could be made. In addition, for many cases, the use of some form of duct insulation will prove of great advantage. In order to reduce the loss of heat from ducts carrying warm air, the use of duct insulation is recommended in the following cases:

a. A duct that extends into or through an unheated space or unexcavated portion of the structure should be insulated. See Fig. 1b.

b. Similarly, a riser that is carried in a studding space that is exposed to the outdoors or to an unheated space should be protected.

c. There exist possibilities of obtaining objectionable drafts in rooms where the supply air is admitted into the room at a temperature less than 110 deg. F. Therefore, in the case of a duct system where one or two ducts are much greater in length than the majority of the ducts, and where there exists a possibility that the register air temperature for the long ducts may be less than approximately 110 deg. F., the ducts should be adequately protected against heat loss.

d. The ducts to first story rooms should be given attention in this respect, particularly if the forced-air system is operated with intermittent operation of the fan. During the off-periods of the fan no appreciable gravity-action will take place in the

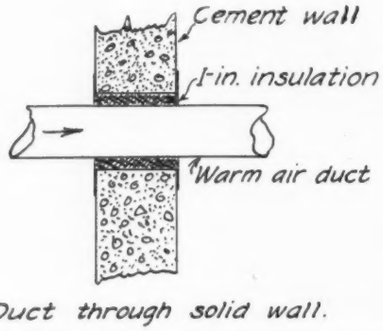

Fig. 1A—Where pipes pass through cold foundation walls the pipe should be insulated as shown to prevent heat transmission from metal to masonry.

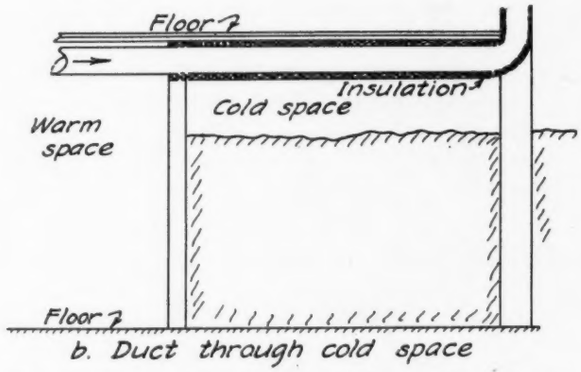

Fig. 1B—Pipes passing through cold spaces (as under sun porches or unexcavated areas) should be insulated to prevent temperature drop.

Sheet Metal Expert *increases profits* with **TRANE** *year round* Air Conditioning

Wm. A Galewski, Jr

How would you like to be the boss air conditioning man in the world's most completely air conditioned city?

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Winona, Minnesota, pretty little city on the Mississippi, has over fifty air conditioning installations! It is reputed to have more installations per capita than any other city in the world. The Winona Heating & Ventilating Company installed practically all of them. Banks, restaurants, stores, theatres led the air conditioning parade. Citizens became accustomed to new comforts. Residential air conditioning boomed.

R. B. Maxwell and his Winona Residence. Architects: Boyum, Sorenson & Schubert, Winona. Plumbing & Heating Contractors: Olson & Son. Air Conditioning Sub-contractors: Winona Htg. & Ventilating Co.

"Who installed your wonderful air conditioner?" people asked.

"Winona Heating & Ventilating Company"—always the same reply. Thus was Air Conditioning Headquarters established in Winona. The snowball of comfort rolled to enormous proportions. Sheet metal expert Galewski threw away his red ink and increased his crew.

To hold costs low enough to be attractive, Trane water cooling coils were used in most units. Wells or city water were the cooling medium, as a rule. Service calls practically unheard of. Operating costs negligible.

Efficient Air Conditioner Furnishes Water for Sprinkling Lawn

In August, 1935, Mr. R. B. Maxwell authorized the installation of a Trane Climate Changer in his modern 11 room home. The installation was designed so that in winter hot water is circulated through the Trane 6-row coil, while in summer 56° water is circulated through the same coil for effective cooling.

Said Mr. Maxwell in August, 1936, after a full year of service: "Through all kinds of weather the Climate Changer has delivered virtually one temperature. Its trouble free operation and low operating cost are amazing. I can water the lawn with the water discharged from the cooling coils. It is a pleasure to have the opportunity of telling others about my experience with Trane equipment."

Satisfied customers like Mr. Maxwell are Mr. Galewski's best salesmen. You can also have these customers if you tie up with Trane.

There is profit in that sort of work, the year round. You can profit in your territory. There is no secret to Mr. Galewski's success—other Trane dealers are making good in a big way. Mr. Galewski offers you this advice:

"Tie up with a good concern that really knows what air conditioning is all about. I'm partial to Trane, myself. They make good stuff, and their representatives really help a fellow out. Give your customers what they are paying you for. If you sell them year round air conditioning, give them year round air conditioning. I get most of my new prospects from old customers. I keep them satisfied. I don't know any other way to do business—I wouldn't do business any other way anyhow."

The 1936 cooling season is over, but 1937 is just around the bend. Heating jobs sold now should be designed so you can add cooling next year. Trane year round air conditioners are the real answer. Complete information is yours for the asking. Tell your troubles to Trane—NOW.

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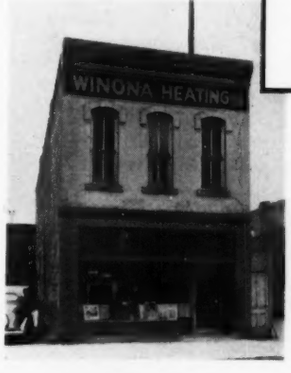
The Trane Climate Changer for Year Round Air Conditioning

Available in a variety of sizes for installation in residences, stores, apartments and many other types of buildings. Trane manufactures a complete line of heating, ventilating and air conditioning equipment to meet every modern requirement.



Mr. Galewski's Sheet Metal Shop

He does no plumbing or steam fitting. On business he secures himself, the steam fitting is sublet. Where the air conditioning is handled as a sub-contract, the Winona Heating & Ventilating Co is recognized as headquarters

The Trane Climate Changer

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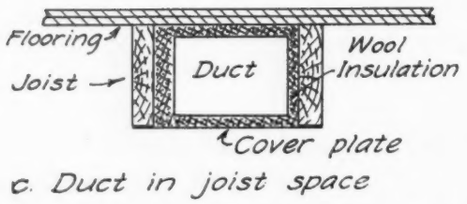
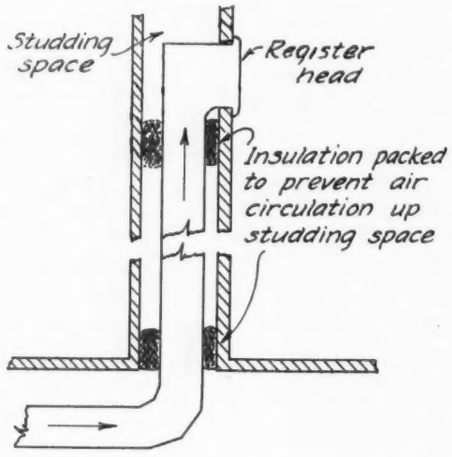


c. Duct in joist space

Fig. 1C—Long runs through joist spaces will not show temperature drop and too-low register air temperatures if the duct is insulated as shown here.



d. Stack through studding space

Fig. 1D—To prevent dust deposition on plaster in front of riser spaces, stop air circulation around pipe as shown here.

first floor leaders and the ducts will tend to cool off when the fan ceases operations. At the beginning of the next fan operation the cool air in the ducts will be discharged into the room, with possible discomfort to the occupants, until the register air temperature has attained its normal value. Note the top curve in Fig. 2, and particularly that portion immediately following the start of the fan operation. The use of duct insulation will minimize this temperature reduction of the air in the duct when the fan stops and hence will tend to eliminate this annoyance.

e. Occasionally there arise cases during the design of a forced-air heating system when it is of importance to obtain the minimum size of duct consistent with the allowable duct velocities. It should be noted that by carrying warmer air to the supply registers the volume of air delivered will be less. Consequently, in some cases it may be more profitable to use one duct which is well insulated than two ducts whose total cross-sectional areas are greater and which are not so well protected against heat leakage.

f. In many installations it is customary to carry the return air ducts from the upper stories of a structure down through the studding spaces on the outside walls. The duct carrying the return air at a temperature of approximately 65 deg. F. will thus be surrounded by air in the studding spaces at a much lower temperature, with the result that the return air temperature will be cooled below 65 deg. F. by the time it reaches the fan. Although there will be a slight increase in the heat load due to this pre-cooling of the return air, the practice offers no difficulties from the standpoint of heat leakage.

However, there is another important factor that should not be overlooked. If the studding spaces, adjacent to that which carries the cold air return duct, are well insulated against heat leakage, the surface temperature of the inside wall surface will be higher than those for walls not so insulated. The wall having no insulation, in other words those walls that have a lower inside surface temperature, will have greater local circulation of the air over the surface than those walls whose surface temperatures are approximately the same as that of the indoor air. These local air currents tend to deposit entrained dust particles on the walls over which they move. The writer has observed that a wall which is "backed" by insulation will be cleaner than an adjacent wall space which is not insulated. In fact, the presence of an uninsulated studding space in a wall in which the rest of the studding spaces are insulated can be detected by observing the cleanliness of the wall surfaces.

It is therefore recommended that in an insulated structure in which the cold air return ducts are carried through on outside walls the space around the ducts should be packed with some form of wool insulation. See Fig. 1e and 1d.

Equations for Determining Heat Loss

In a paper entitled "Surface Heat Transmission," R. H. Heilman of the Mellon Institute of Industrial Research has presented some results based on his experimental work on emissivity coefficients for "low" temperature work. The total heat transmitted from a hot surface to the surrounding air is regarded as being composed of the heat lost by radiation to surroundings

(*Continued on page 66*)

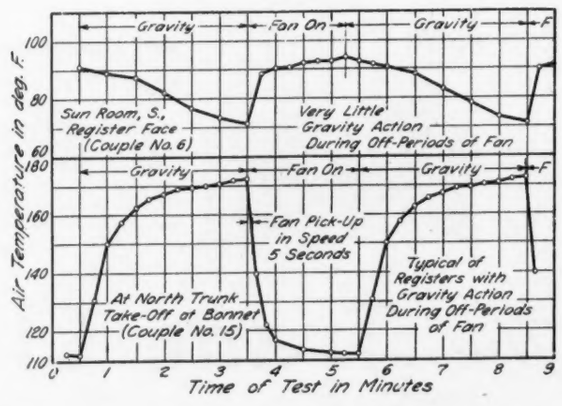

Gravity
Fan On
Gravity
F
Sun Room, S., Register Face (Couple No. 6)
Very Little Gravity Action During Off-Periods of Fan
Fan Pick-Up in Speed 5 Seconds
At North Trunk Take-Off at Bonnet (Couple No. 15)
Typical of Registers with Gravity Action During Off-Periods of Fan
Air Temperature in deg. F.
Time of Test in Minutes

Fig. 2—Typical variations in air temperature with intermittent fan operation.

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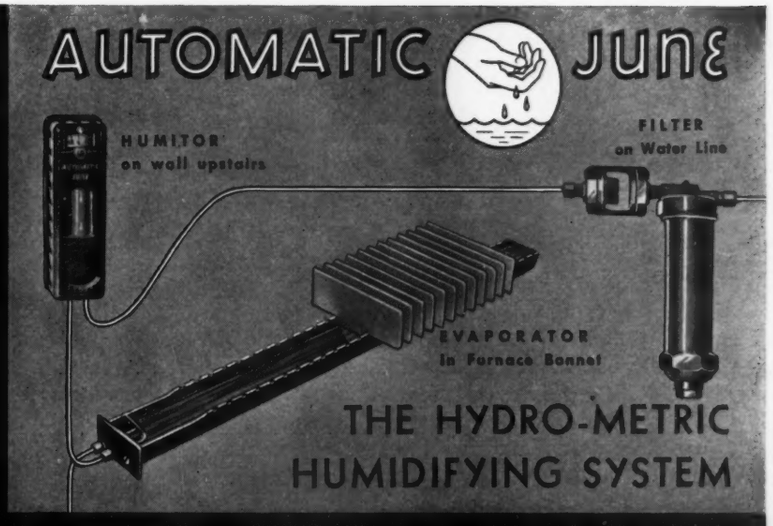

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Some Physical Comfort Aspects of Air Conditioning

By Malcolm Tomlinson

THE question of human comfort first became acute in mines. As working levels were driven deeper and deeper into the earth the air temperatures and humidities gradually increased. In deep mines it was found impossible for the miners to produce as much for a day's effort as had been possible when the same mines were less deep. At first relief was sought through ventilation by means of fans and blowers, but as little improvement was had through this method, the effect of humidity, as well as air motion, was studied in order to determine the cooling and heating effects of air in terms of comfort. Some of the results obtained are brought out in this article.

Human comfort of the sort that interests the heating engineer and contractor is tied up with the physical reactions of the body. Furthermore, as far as we know today, it is only physical comfort which can be affected through weather control. Now the kind of weather which furnishes physical comfort to those in perfect health is very likely to be most uncomfortable to those who are ill. It is this phase of comfort work which is still in the experimental stage.

The Pulse Beat Index

A graphical picture of the heating and cooling effects of air, under working conditions, can be secured with Fig. 1. Here the index for comfort is the increase in pulse beats per minute over a period of one hour. This index is quite satisfactory as the pulse is more sensitive to body reactions than any other physical measurement known. This index is plotted against the dry bulb temperature. Three distinct groups of curves are obtained which indicate the effects for 100, 60 and 30 per cent relative humidity. Each group or set of curves covers both still air and air movement at 350 feet per minute. The men under observation were working at the rate of 2.7 horsepower of effort per hour. To find the heating effects of air shown by these curves it is only necessary to trace the action produced by a rise in the relative humidity, the decrease in air motion and the rise in temperature. For cooling effects the opposite procedure tells the story.

These curves show decided trends in effect of weather factors on the pulse rate and indicate what can happen to an individual under any of the weather combinations which can be picked from the six curves. It will be noticed that each set of curves cross at a temperature above 100 degrees dry bulb. The exact temperature varies with the humidity. Above these three points still air is cooler and more comfortable than moving air. Below the reverse is true. The significance of these results will be appreciated later when we will find that 350 fpm is the practical limit of cooling by means of air motion. One fact made clear by these curves is that, for the same pulse condition, lowering the relative humidity will permit one to stand a higher dry bulb temperature. Since the pulse increase is an index of comfort the same fact applies for equal comfort conditions.

Cooling-Heating Neutral Zones

From what has been seen with the aid of the curves in Fig. 1, it is evident that there is a neutral point where the cooling effect of air motion becomes a heating effect and also that this neutral point changes with the relative humidity. In Fig. 2 we find that there are two neutral lines, formed by such neutral points, which separate the zone of air motion cooling from the zone of high temperature air motion heating and the zone of low humidity air motion heating. These neutral lines have been plotted on a psychrometric chart and the neutral points are those which obtain for still air conditions. In Fig. 1 the actual temperatures represented by the points were for the intersection of still and moving air curves.

The remarkable effects of humidity and air motion

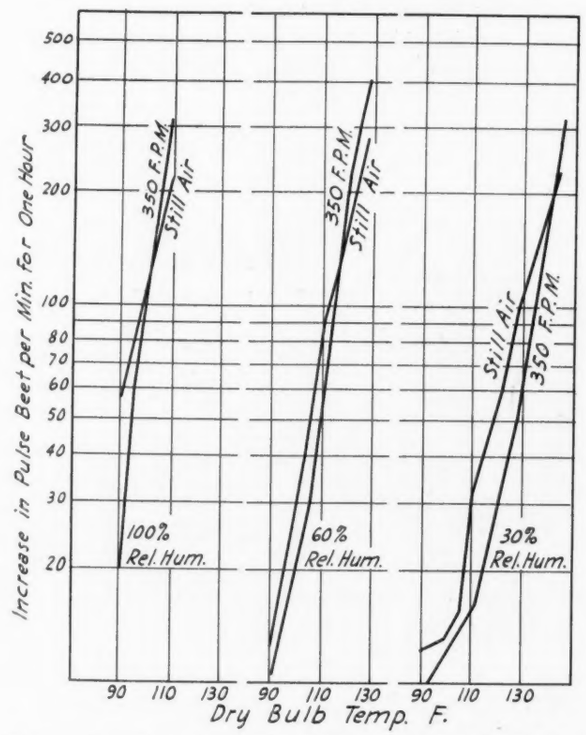
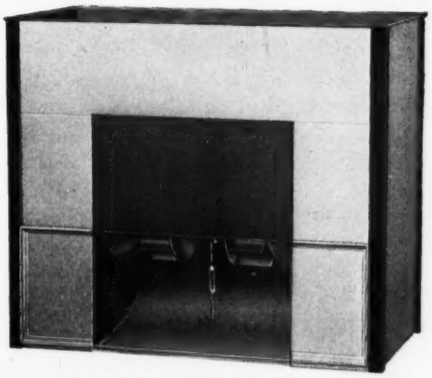


Fig. 1. Lowering air temperatures and relative humidities gives cooling effect. Raising either of these factors produces heating effect.

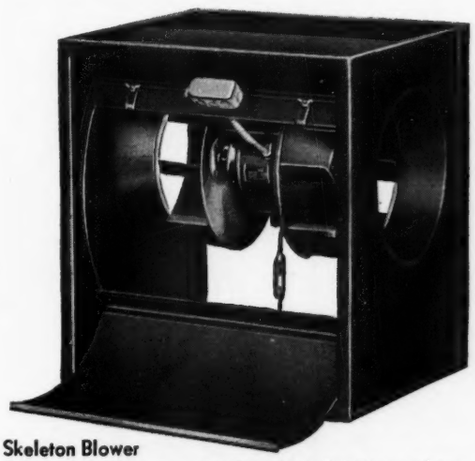
NATIONALLY FAMOUS EMERSON FURNACE BLOWERS NOW AVAILABLE IN COMPLETE LINE OF PACKAGE UNITS



Front view (discharge side) of Emerson Package Unit Blower, showing its compactness.

Rear View of New Emerson Blower Package Unit

Here you can see how easily this package-unit housing slides over the skeleton blower scroll and is securely bolted in place to form a complete package unit. Note position of filters through observation door.



Skeleton Blower

For the manufacturer or installer who builds his own housings—the Emerson Skeleton Blower is recommended. Specially engineered, multi-speed motor—on rubber spoke mounting—blower wheels and scroll are ready to fit right in with your own unit. Complete with 8-speed control unit.

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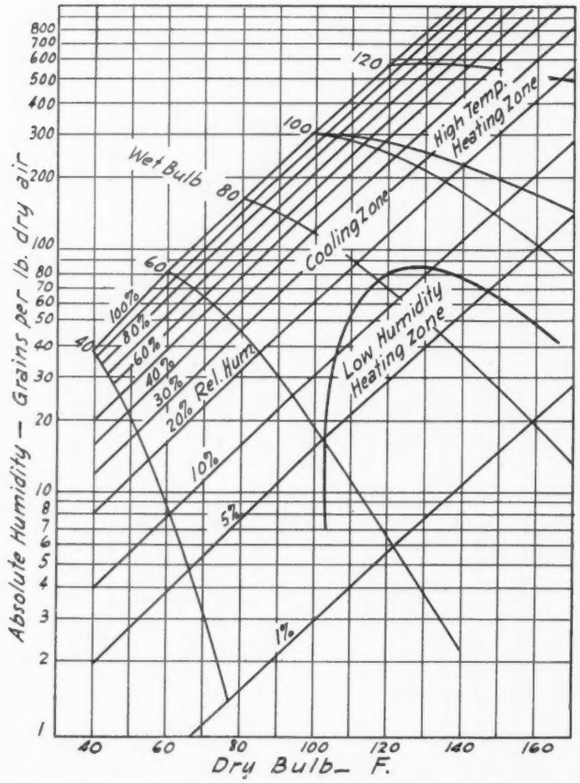

Fig. 2. There are two zones where the heating effect predominates. At high temperatures and at low humidities.

on comfort, due to the reactions produced on and in the human body by heating and cooling, are to be seen in Figs. 3 and 4 where air motion is plotted against dry bulb temperature and nine lines of equal comfort are shown. As these lines, as far as comfort is concerned, correspond exactly for the two charts the interval covered, in comfort, is exactly the same. For example, there is the same amount of comfort between the first and last lines on each chart even though the dry bulb temperature interval is 126 degrees for Fig. 3 and only 80 degrees for Fig. 4. It is quite evident that the effect of 100 per cent relative humidity is different from the effect of 20 per cent. These curves are valuable since they can be used in the place of the comfort charts for rapid comfort calculations. Therefore, the boundaries for the upper, or summer, and for the lower, or winter, comfort zones have been indicated by dotted lines.

The use of these charts can be illustrated by a practical problem. Assume people living under gravity air motion in a dry climate with an average dry bulb of 110 in summer and 70 in winter. How can cooling and air conditioning help to secure comfort? It is first necessary to consider that the clothing worn will be lightweight all year so that the solution sought will be found at the upper and lower limits of the upper,

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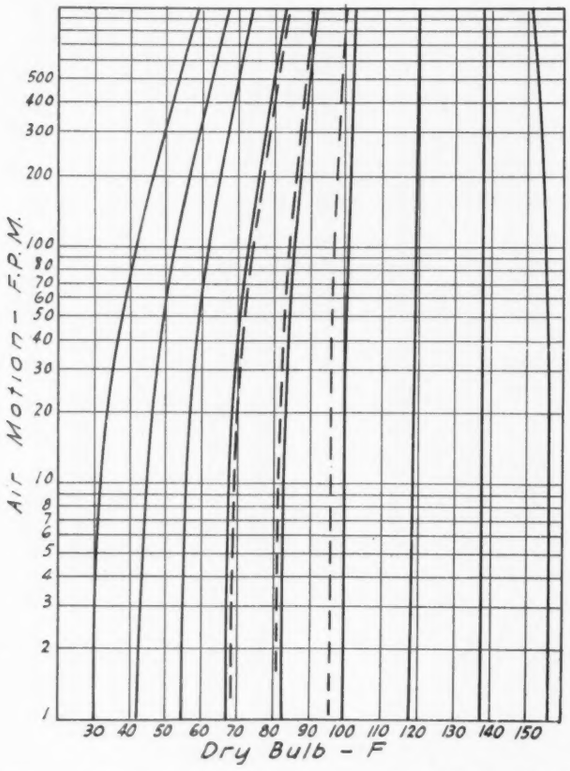

Fig. 3. For 100 per cent relative humidity there is neither heating nor cooling effect at 100 degrees dry bulb.

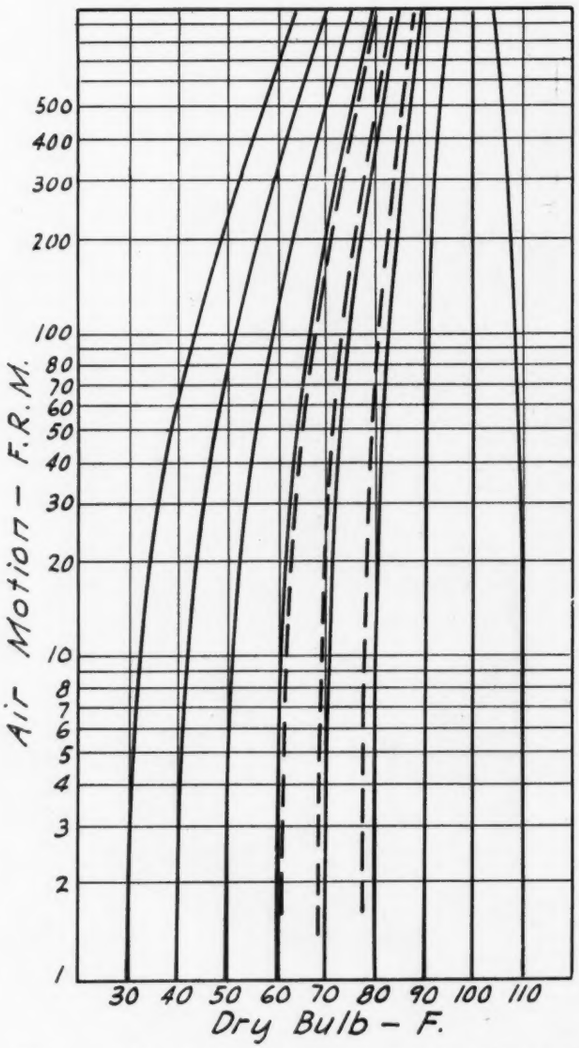

Fig. 4. For 20 per cent relative humidity the neutral line between heating and cooling effects is 136 degrees dry bulb.

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The Construction: Wilson progressive construction utilizes the full impingement capacity of keratin; the first loose layer allowing easy access to air, traps part of the dust, while the second denser layer performs the clean-up work.

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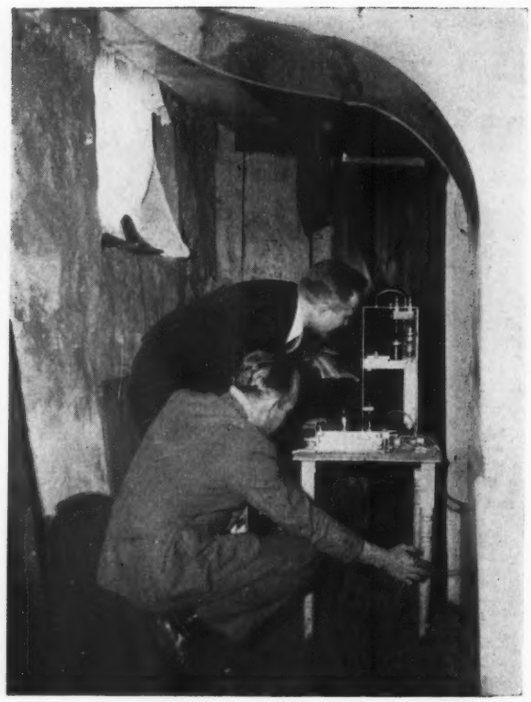


Combustion Efficiency Should Be the True Measure of Oil Burner Performance*

By T. H. Smoot[1]

MANY of the difficulties oil burner dealers have become involved in have resulted from the willingness to guarantee that the oil burner will maintain a temperature of 70 to 72 degrees at the thermostat.

The oil burner, in combination with the heating plant, will do this, of course, but when this is translated into comfortable heating effect the results may be extremely unsatisfactory. Faulty distribution from the heating plant and poor building construction may combine to cause a temperature of as low as 60 degrees at the floor when 70 to 72 degrees is maintained at the five foot level which is the conventional location for the room thermostat. In other parts of the building unsatisfactory temperature conditions may prevail not only at the floor line, but also at the breathing level because of incorrect design of capacity of the heating plant.

Burner Alone Can't Guarantee Heat

Actually, therefore, any guarantee of temperature conditions in a building involves not only a guarantee of the burner but of the heating plant, also. An aggressive and successful oil burner or warm air heat dealer must occasionally make this overall guarantee and it is quite apparent therefore, that a responsible oil burner dealer must be also a competent and well informed heating man in order that before the sale is made he can determine from a heating survey the approximate performance of the heating plant and be prepared to recommend in detail corrective methods for plant inadequacies.

From a consideration of the above conditions it is obvious that temperature regulation in a building is not a proper standard for rating the quality of an oil burner because a very inefficient burner by burning an excessive quantity of oil can be made to hold an enclosure along a satisfactory line of temperature regulation when the burner is installed in a good heating plant. On the other hand, a very efficient burner may produce wholly unsatisfactory temperature regulation in combination with a poor heating plant. Entirely independent of heating plant performance, therefore, there should be a generally applied and universally required standard for gauging the performance of the burner alone and that standard is its combustion efficiency as determined by an analysis of the products of combustion.

The oil burner industry has maintained a steady improvement of its burner equipment, and there has been an accompanying march of progress in refinement of control and accessory equipment. Of as great importance also is the adoption and general use of uniform fuel oil specifications which provide for the delivery of the proper grades of oil as required by burners of different combustion characteristics. All of these factors have contributed to raising the level of burner performance to a plane where reliability of operation, absence of objectionable sound and cleanliness of combustion are no longer major questions.

Combustion Efficiency Varies

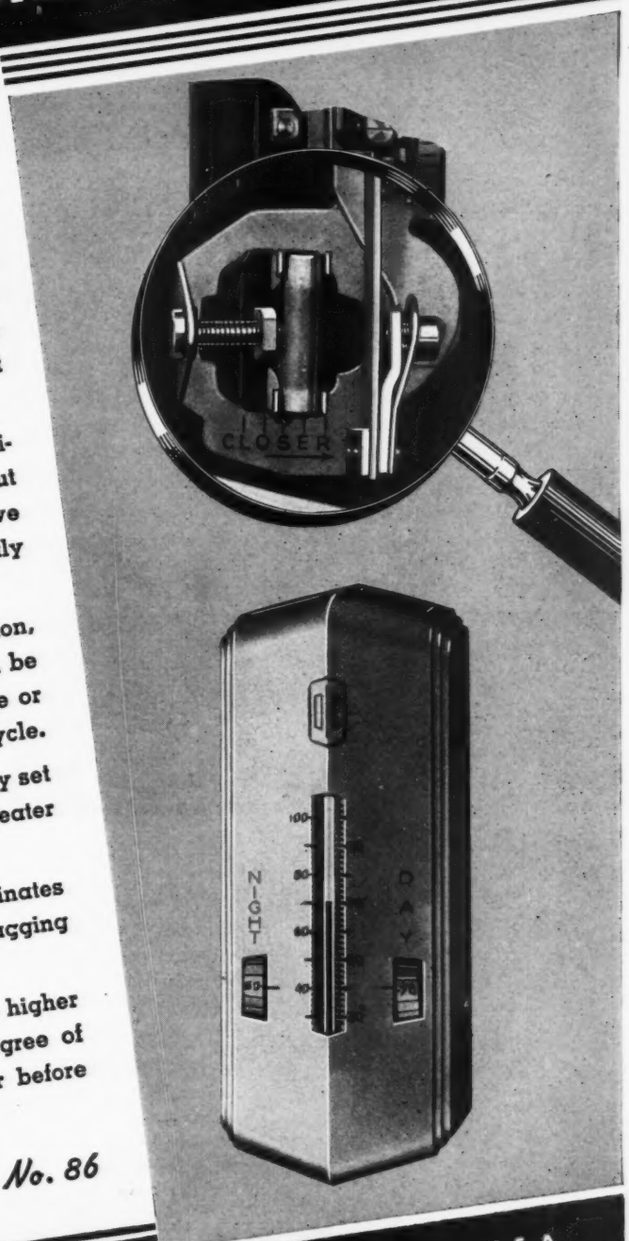
The greatest variable in connection with the operation of the fully automatic burner today is its combustion efficiency and consequently its economy of operation. Along with the progress in other characteristics of burner operation the oil burner manufacturing industry has made major strides in raising the combustion efficiency of its equipment, and today a few burners are available that closely approach the theoretical maximum efficiency. Some burners because of the principle of combustion they are designed for are inherently more efficient than others. On the other hand there is a reasonable and satisfactory minimum standard of combustion efficiency that any burner should meet in the interest of economy and conservation of fuel resources.

The measure of combustion efficiency is the CO_2 (carbon dioxide) content of the flue gases. The prin-

(*Continued on page 79*)

*Based on an address to a sales meeting of the Nelson Co., Detroit.
[1]Chief Engineer, Fluid Heat Division, Anchor Post Fence Co.

THE *two-eleven* SETS A HIGHER STANDARD OF PERFORMANCE



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Another seemingly simple engineering revision eliminates the possibility of the indoor temperature curve sagging in very cold weather.

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Write for technical bulletin No. 86

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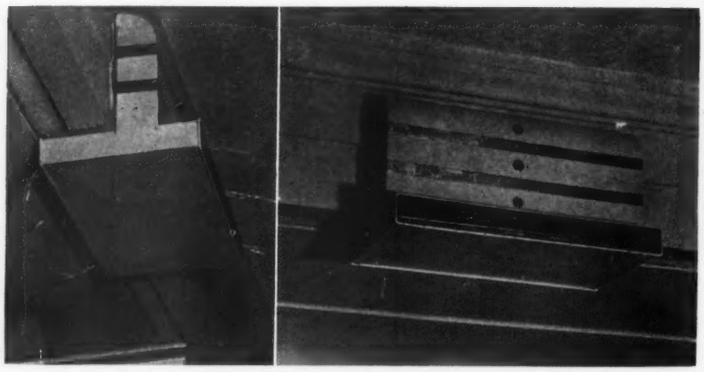
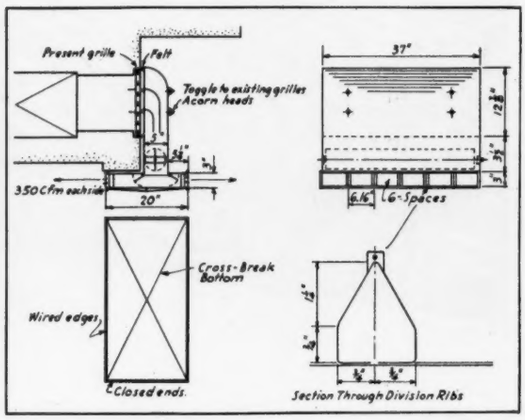
NEW YORK, N. Y.—40 West 40th St. • CHICAGO, ILL.—816 S. Michigan Ave.
LOS ANGELES, CALIF.—320 Crocker Blvd.

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

Canadian Representative—RAILWAY AND ENGINEERING SPECIALTIES LIMITED, Montreal, Toronto, Winnipeg

Outlet Fixture for Conditioned Air Distribution





Air outlet fixture attached to existing ventilating grille to direct conditioned air toward side walls as well as toward center of auditorium

THE novel air outlet fixture illustrated here was worked out for the silica gel air conditioning system for the home service auditorium in the Peoples Gas, Light & Coke Co.'s building in Chicago.

The auditorium is a large hall two stories in height, along each side of which runs a bay one story high. An existing ventilating duct ran along each side of the hall, immediately above the one story bay, discharging air horizontally toward the center of the auditorium only.

When air conditioning was installed, it was desired to use these existing ducts, but it was deemed necessary for the air to be discharged not only toward the center of the auditorium, but back under the ceilings of the one story bays as well. The outlet illustrated was therefore designed to fit over the existing ventilating grilles, taking the air down just below the ceiling level of the bay and there discharging part of the air toward the center of the auditorium and part into the bay. The fixtures—ten were required—are nicely finished with a bright metal trim and do not in any way mar the appearance of the auditorium.

Careful observations since the air conditioning plant was put into operation indicate very satisfactory air distribution.

NOW YOU CAN SELL AUTOMATIC OIL HEATING TO THE BIG MARKET

Model 100 A Lochinvar All Welded Steel Furnace with built-in Automatic Lochinvar Burner. Has blower, air filtration, humidification and complete automatic control—a high grade winter air conditioning plant.

THE value of automatic oil heating is widely recognized. But thousands in the huge middle class market can't be sold high price equipment.

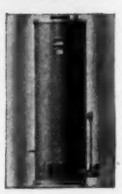
Lochinvar puts this BIG MARKET within your reach.

The patented Lochinvar Burner available in Lochinvar Furnaces, Automatic Winter Air Conditioning Plants, Room Heaters and Automatic Water Heaters—operates on a new, more efficient principle, which eliminates motors, pumps, blowers or other devices which run up cost, need servicing and make noise.

Its performance—fully automatic—clean, silent, efficient, reliable—will stand up beside that of the most costly equipment. You can guarantee it to the limit. The low price was not won by scrimping but by improvement and simplification. Manufacture is the best obtainable.

Let Lochinvar Open the Big Market for You.

Model 100 Lochinvar All Welded Steel Furnace with built-in Automatic Lochinvar Burner. Full automatic control — economical of fuel.



Lochinvar Water Heaters — 1600 gallons hot water per dollar fuel cost (oil at 8c.).

The Lochinvar Burner—its simple effectiveness eliminates expensive equipment.

LOCHINVAR CORPORATION
11921 Grand River Ave. Detroit, Mich.

Lochinvar

Lochinvar Corporation
11921 Grand River Ave., Detroit
Please tell me all about Lochinvar.

Firm .....

Street .....

City .....

ADD UP THE FACTORS THAT HELP YOU SELL

ADD THESE UP, AND THEN ADD ONE MORE: the additional acceptance that General Electric motors will give your equipment. These five factors mean SALES AT A PROFIT!

Your prospects know warm-air and air-conditioning equipment by reputation, and associate high quality and good service with names well known in these industries. In a similar manner they associate General Electric with the best electric equipment, for General Electric has been making superior motors for warm-air and air-conditioning equipment as long as motors have been used on this equipment.

Hence it's like adding 2 and 2—good (warm-air and air-conditioning) equipment plus good motors, and the recognized reputation of the equipment manufacturer plus the recognized reputation of General Electric. They make an unbeatable sales combination.

General Electric, Dept. 6A-201, Schenectady, N. Y.

070-151

GENERAL ELECTRIC

LET G-E MOTORS HELP YOU SELL

8200 OUT OF 10,000 SAY "GENERAL ELECTRIC"

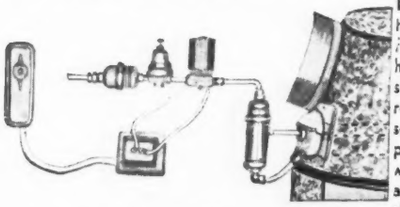
In a recent impartial survey of motor buyers, a leading publisher asked: "When you are next in the market for motors and control, which manufacturers will you ask for quotations?"

General Electric was included by 8200 of the 10,000 who answered. It was first choice with 5300, as compared with 1950 for the manufacturer that ranked second.

HUMIDIFICATION

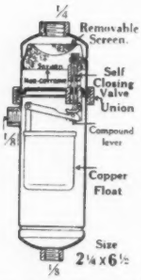
IS THE 2ND STEP IN AIR CONDITIONING—

So take your pick . . . .

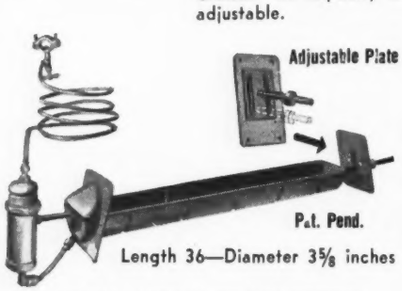


No. 85?-CH DE LUXE HUMIDIFIER

The Deluxe Model is all the name implies. It is furnished complete with humidistat, transformer, solenoid valve, pressure reducing valve, filter screen, copper water piping, saddle valve, water-boy feed valve, all fittings and a pan stamped in one piece from genuine sheet bronze. Its capacity is adjustable.

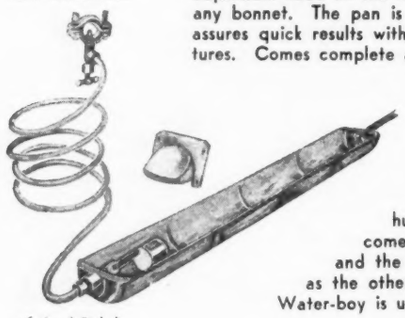


05 WATER-BOY is built of monel metal, nickel, silver, brass, and copper. It may be placed away from unit to prevent corrosion.



Length 36—Diameter 3⅝ inches

NO. 85-CH AUTOMATIC HUMIDIFIER. The pan and the feeder is the same as the Deluxe Model and has the same adjustable plate on the overflow to cut down the capacity of evaporation to prevent over-saturation in extreme cold weather. It is equipped with an adjustable hood on the front to fit the slope of any bonnet. The pan is as thin as paper and assures quick results with low bonnet temperatures. Comes complete as shown.



THE NEW 555-H SPECIAL

is a low priced yet efficient automatic humidifying unit. It comes complete as shown and the pan is the same type as the other models. The No. 55 Water-boy is used as a supply valve.

NO. 95 AUTO-VENT humidifies the room and vents the steam radiator. Size 1⅞" x 4¼".

THE NEW 55 WATER-BOY is a midget ball cock. It is built of monel metal, nickel, silver, brass and copper. Size 7" long over all. Float 1⅛" in diameter. The body is equipped with a monel metal filter screen. The float may be adjusted for any depth of water from 1" upward. It is an ideal feeder for any type pan or humidity. It is sensitive and positive. Connections for ¼" OD copper tubing.

Because of large production, all Maid-O'-Mist products are popular priced and are used as standard equipment by many manufacturers.

MAID-O'-MIST, Inc.

180 N. WACKER DRIVE CHICAGO, ILL.

Cost Per Pound Vs Price Per Opening

(*Continued from page* 41)

and Chicago, with labor prices comparable to Cleveland, averages about 12½c per pound for actual labor in fabrication. That is shop labor and not installation labor.

So our cost in the shop will be $158.13.

Before we estimate erecting cost let me say that under the union rules of Cleveland the emloyer is allowed to work on the job, but not on the erection. In addition, the rules here say that if a shop is a union shop the employer may work on the job if the employer himself is a union man and employs union men and uses an additional union man on the job with him. Our regulations now say that no shop owner can become a union man from now on—only those holding cards prior to a certain date, so the majority of shop owners are not union men and therefore do not work on the job.

We have a total thus far, of $624.49. We must take into consideration our profit and an additional item which is the item of labor of installation of the job. In other words, we assume that up to and including this stage we have delivered on the job everything necessary to install, and our job from now on is to hang the already fabricated fittings for the job.

Must Add Labor Cost

The labor cost of installation for this duct work would be on the basis of three days, using two men, at our prevailing wage scale of $10.00 per day, per man, or $60 additional for labor. Now we should have the right to charge into this labor actual cost, an overhead figure which takes into consideration compensation insurance and other items of expense.

I would say that 50 per cent of the labor cost is not a bit too high for the overhead of labor. National surveys based on shops doing from $10,000 to $250,000 annually show the overhead figure to be added to labor, is 65 to 85 per cent. So, for the benefit of this discussion let us use 75 per cent, added to estimated labor cost. Our labor cost (shop fabrication plus erection) is $218.13, plus 75 per cent, approximately $154.00 for overhead, bringing our job to $851.49, and yet we have not added a figure for profit.

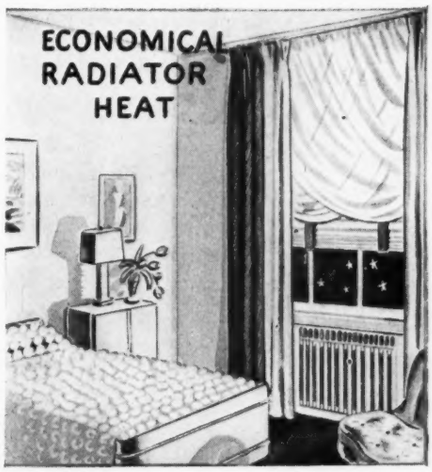
The usual figure to be added for profit is 10 per cent. Ten per cent would be, in this instance, $85.15, or the job should sell to the consumer, whether he be contractor or whether he be an actual owner, for the total sum of $936.64.

This is quite a bit higher than the $691 which we established as the selling price based upon $20.00 per opening. Two hundred and forty-five dollars is the difference. How many men can stay in business with a possible loss of this magnitude facing them on an average job?

Cost per pound or price per opening? It's a silly argument unless and until every one using a per opening basis boosts his unit price far beyond any figure used to date in the Cleveland area.

FITZGIBBONS

Boiler-Air Conditioner for "Split Systems"



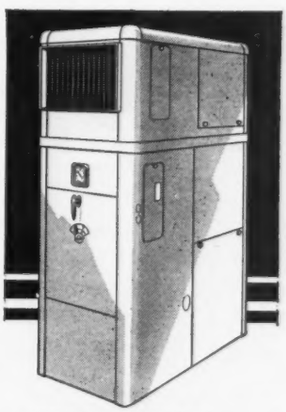
Right in line with the up-to-the-minute view of air conditioning, this versatile unit permits the placing of radiation of those rooms where it is undesirable or unnecessary to supply conditioned air. To all other rooms it will supply cleaned, tempered, humidified, circulated air in the volume desired.

In addition to all this, the Fitzgibbons Boiler-Air Conditioner supplies HOT WATER for kitchen, laundry and bath, ALL YEAR 'ROUND, with no tank or other equipment to mar the appearance of the basement recreation room.

In short, from a single compact and tastefully designed unit, you get CONDITIONED AIR, economical STEEL BOILER HEAT, and automatic, year-'round HOT WATER SUPPLY with no outside equipment. This unique combination of essential functions is proving of tremendous value in the establishing of air conditioning as a normal service in the modern American home.

•

Every oil burner dealer will want the complete story of this unit. Write us direct, or our representative near you for the new bulletin just off the press.



ANY OIL BURNER is at home in this unit. The jacket has not been enlarged a single inch to provide the required space. When desired, however, the burner can be placed outside the unit.

Every advantage affecting burner performance of the famous OIL-EIGHTY boiler has been retained in this unit.

•

In addition to the unit pictured above, we can supply the FITZGIBBONSAIRE —an individual air conditioning floor unit for use in connection with a Fitzgibbons boiler.

Fitzgibbons Boiler Company, Inc.

GENERAL OFFICES:

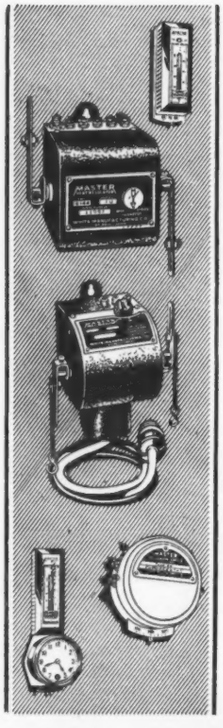
ARCHITECTS BLDG., 101 PARK AVE., NEW YORK, N. Y.
Works: OSWEGO, N. Y.

BRANCHES AND REPRESENTATIVES IN PRINCIPAL CITIES

The railroad man's watch MUST be reliable because human lives depend upon the exactness of its time-keeping qualities. A variation of a few minutes might cause two great trains to come hurtling together upon a single track.

ACCURACY

For the protection of human health and assurance of comfort the same qualities of precision are built into the



MASTER HEAT REGULATOR

For over twenty years these devices have been manufactured by skilled mechanics with the care which assures perfection. Type B-22—two positions—is ideal for the small home. It is thoroughly reliable, noiseless, accurate and responsive to temperature changes of 1 degree. It will outlast the heating plant. Listed as standard by Underwriters Laboratories.

Type B-22

Dealers, contractors and architects are invited to write for full information.

only **$13.50** to dealers

Made by the Manufacturers of the famous Type B-144, the Original Gradual Control Heat Regulator.

WHITE MANUFACTURING CO.
2362 University Ave., St. Paul, Minn.

MASTER HEAT REGULATOR

Geiger on Noise Problems

(*Continued from page* 43)

25 or 30 per cent less than that given in the table. On the other hand, if the bedroom is situated in a noisy apartment house next to an elevated train line and if the occupant appears to be leading a calm and placid existence, Table II can be forgotten and as much air blown through the grille as the blower will give.

The table has been computed for two grilles whose noise curves are given in Fig. 3. Grille A is a noisy grille having a wide air spread and Grille B a quiet grille with a narrow spread. If the manufacturer can not furnish a noise curve for the particular grille to be used, it will be safe to use the figures for Grille A if the spread is wide and figures half way between Grille A and Grille B if the spread is narrow.

Methods of Reducing Noise

Since this paper is written from the point of view of an installer of air conditioning equipment rather than from that of a manufacturer, suggestions for

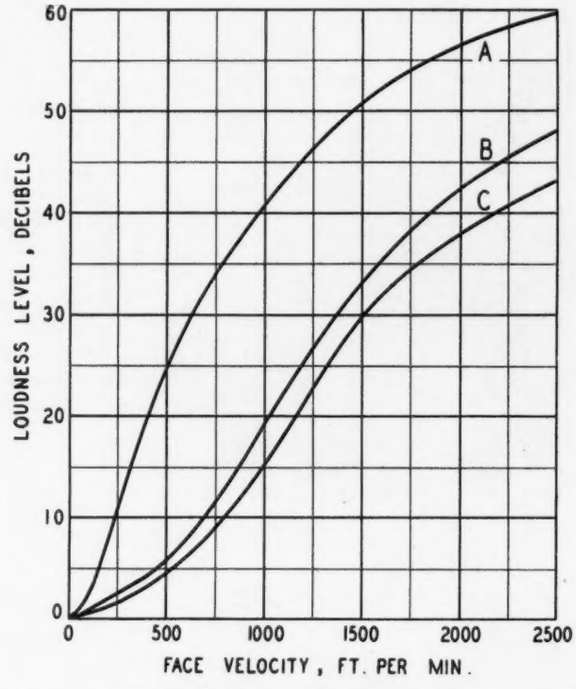
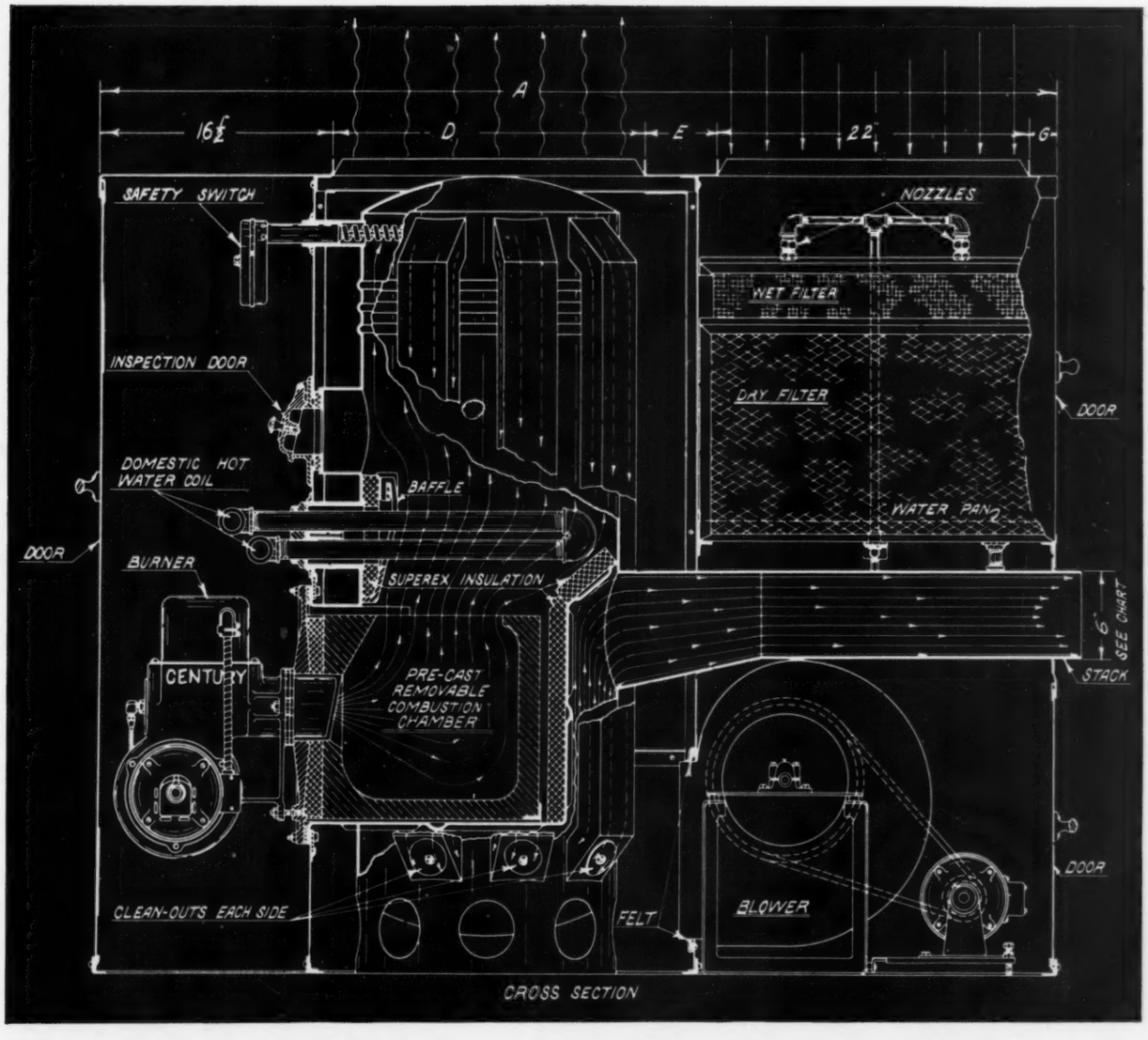


Fig. 3.—Loudness of Three Grilles, plotted on a decibel scale. These curves are the basic curves for computing noise.

quieting are confined to procedures to be used in the installation of equipment rather than in the manufacture.

To keep grille noise down to the desired value, the answer is obviously the use of low velocities. However, if the installation demands a long throw, the installer has no choice but to use a sufficiently high velocity. If it is found that the conditions of the installation require a higher velocity than that given by Table II, earnest consideration should be given to the plans to see if they can not be altered so that shorter throws may be used. It may be that an increase



CROSS SECTION

A New Winter Air Conditioning Unit by CENTURY

Now Century offers an utterly new unit for winter air conditioning. It develops maximum efficiency. Exceptionally high CO^2 readings and unusually low stack temperatures make possible an average of 85% recovery from fuel. All in one of the most compact, comparatively small, and single units you've ever seen.

Nothing can better illustrate its radically different principle of operation than the cross-sectional drawing above. Instead of one large radiator, there are six small ones equally and vertically placed about the primary furnace. An arrangement that assures perfect heat balance to the passing air stream, and uniform temperature in the air ducts.

Fire and gas travel is unusually long . . . 30% to 50% greater than conventional. Following ignition in the special pre-cast removable drawer type Century refractory, complete combustion and expansion occur in the primary areas of the furnace shell proper. Then, the gases enter the six radiators, travel downward, back into the original shell under the refractory. It acts as a manifold and conducts the gases to the rear and upward, back of the refractory into the stack and through the blower and filter portion of the unit. This creates an extra heating surface that tempers incoming air . . . as much as 25 to 30 degrees, and assures desired bonnet temperature quicker with shorter travel.

Century offers many other new features, too. A new method for washing and filtering air creates correct humidity and increases dry filter life. A new type cabinet design for beauty and easy accessibility. Fully enclosed burner and controls. Copper-bearing steel construction electrically welded and hydrostatically tested. Domestic hot water. And many others.

Write today for complete details, illustrations, and the surprisingly low price. Two capacities, X-100 for 100,000 B.T.U. and X-200 for 166,000 B.T.U. output per hour.

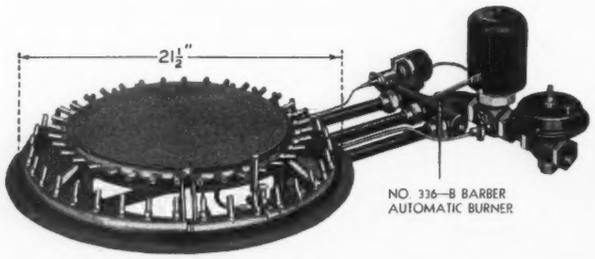
Century Engineering Corp.

CEDAR RAPIDS, IOWA

CONVERSION OIL BURNERS — BOILER UNITS — FURNACE UNITS — WATER HEATERS — HUMIDIFIERS

What

BARBER BURNER "LEADERSHIP" Means to You



THE impressive record of Barber Automatic Gas Conversion Burners, over a period of more than 18 years, has a definite meaning for you. You are interested in *bigger sales*—"clean" sales—without frequent servicing and removals. You customers insist on *trouble-free* heating and *sensible* fuel costs. Barber Burners have exclusive, patented features of *combustion* and *operation* which no other burner *can* copy. By unquestionably superior performance, Barber Burners have won the loyal support of a host of *alert* and *substantial* Heating Dealers and Gas Appliance Manufacturers.

Eight "tailor-made" sizes to accommodate round grate, diameters from 12" to 34". Also "tailor-made" to SUIT and FIT the grate dimensions of oblong furnaces or boilers. Insure a "scrubbing" flame action on side walls of firebox, at the proper level, with 1900° Fahrenheit flame temperature.

No fire brick or refractory elements needed to deflect the flame to the side-walls.

Barber Burners require only 70% of the installation time of average Burners using refractories.

Equipped with the improved Barber vacuum-principle noiseless jets, unequalled for air-mixing efficiency, unaffected by dirt, corrosion or condensation.

Furnished with "Baltimore" or "Klixon" Safety Pilot Control—positive and accurate.

Listed in the A. G. A. Directory of Approved Appliances.

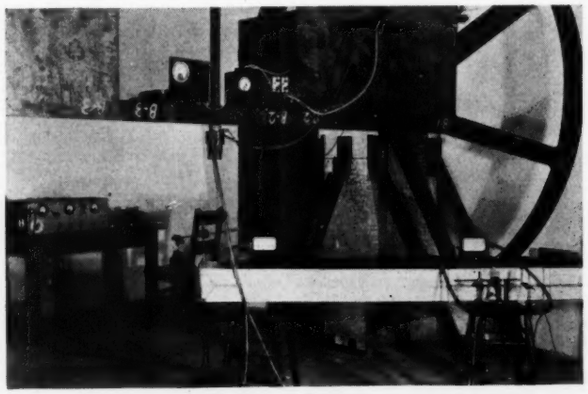
We supply Sales Literature, Specification Data Sheets and Practical Sales Assistance. Write at once for our new Illustrated Catalog No. 37 and Revised Price List.

THE BARBER GAS BURNER CO.
3704 Superior Ave. Cleveland, Ohio
Address Michigan Inquiries to
The Barber Gas Burner Company of Michigan
4475 Cass Ave., Detroit, Michigan

BARBER *Automatic* JET GAS BURNERS
for Warm Air Furnaces,
Steam and Hot Water Boilers
and Numerous Other Heating Appliances

in the number of grilles, distributed throughout the room will permit the use of low velocities.

The value of flexible mountings for quieting motors is well known, yet frequently they are used so that little if any quieting is secured. The object of such mountings is to prevent the transmission of vibrations from the motor to any large surface, such as a wall. If a bolt touches both the motor and the supporting frame, most, if not all, of the advantage of the flexible mounting is lost. Bolts insulated with soft rubber will provide a remedy, or the mounting can be arranged so that no bolt touches both the supporting structure and the motor. A test of the efficacy of the mounting may be had by comparing the noise made by the motor when mounted and when held in the hands. If the mounting



Experimental set-up for determining the noise of grilles. The large reflector at the top of the picture rotates so that readings of noise need to be taken at only one position in the room. The wheel in the rear was provided for other experiments; it played no part in the measurements described.

increases the noise noticeably, it is not as effective as it might be.

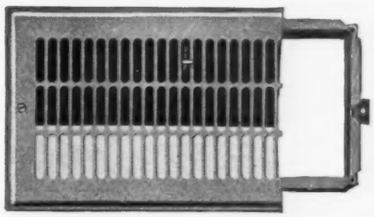
Checking Noises

To determine whether an unwanted noise is due to the motor or the blower, turn off the power and listen. Motor noise, other than that due to poor bearings, will die out immediately, whereas the blower noise will continue for a short time. Sometimes a decrease in noise may be secured by setting the blower on soft cork or rubber and by using short sections of canvas ducts.

If the blower noise is loud enough to be carried through the ducts to the living rooms, lining the ducts with a sound absorbing material, of which there are many on the market, will result in a marked improvement, especially if the lining is continued around a bend in the duct. In lining ducts it should be remembered that noise can travel up the return air ducts as well as it can the supply ducts, so both should be lined for an equal distance. Except in extreme cases it is unnecessary to line more than about ten feet. The most effective place for sound absorbing material is the place where the sound is the loudest, which usually means near the blower. If the blower is in a small room, with no sound absorbing surfaces, some improvement, especially for high pitched sounds, may be had by covering part or all of the wall and ceiling surfaces with sound absorbing material.

Now... AUER CLASSIC REGISTERS

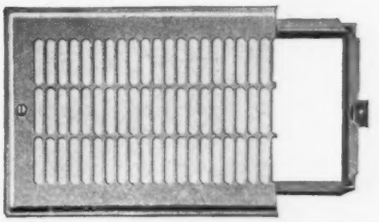
With Double Frame!



CLASSIC Register with Double Band Frame

Detail of Double Frame from Back

CLASSIC Intake with Double Band Frame



AUER has another improvement—this time on registers with band frame. AUER now uses a *double* frame for a stronger, tighter installation, and for elimination of any possible warping of face. Examine this new feature—you'll agree that it's worth while. It costs *you* nothing additional.

AUER Stamped Steel Registers and Grilles are built for all heating and air conditioning purposes—and built for permanent beauty and efficiency. A type for every decorative scheme. Ask for the AUER Catalog, showing the complete line.

Write for Air Conditioning Register Catalog 36A.

THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

AUER DISTINCTIVE REGISTERS & GRILLES For Air Conditioning *and* Gravity

MUELLER *has Standardized on* AMERICAN FURNACE FILTERS

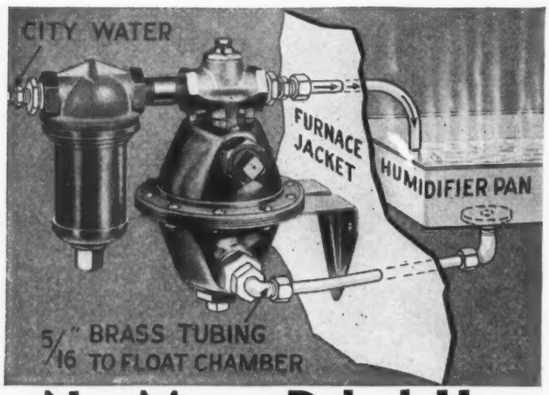
THE reputation which Mueller Climators have established in the field of domestic air conditioning is the result of years of experience combined with competent engineering, careful design and quality workmanship.

That American Furnace Filters are used as standard equipment on all conditioning units manufactured by L. J. Mueller Furnace Co., Milwaukee, Wis., is evidence that they too meet the requirements of exacting engineers, as to design, workmanship and performance.

Bulletin 117-C will bring you complete information on the AAF Line of Furnace Filters. Write today.

AMERICAN AIR FILTER COMPANY, INC.
INCORPORATED
113 Central Avenue, Louisville, Kentucky
In Canada - Darling Bros., Ltd., Montreal, P. Q.

AAF
FURNACE FILTERS



No More Dried-Up

--- or Flooded ---

Humidifier Pans

EVERY dried-up humidifier pan—every limed-up valve—is one more reason for installing this quality, float-operated valve which has been expressly designed to maintain the water level in the humidifier pans of warm air furnaces.

Long experience in designing water level controls for heating boilers showed us what was needed in a water level control for furnace pans:

(1) A valve that will not stick. It is isolated from the heat of the float chamber so that the water surrounding it never reaches the temperature at which lime and scale is formed—a patented feature.

(2) Handles water at any pressure up to 150 pounds—no reducing valves needed.

(3) With Plenty of Capacity. "Direct-flow" design permits water at full pressure to flow directly through valve and into the pan.

(4) Protected by bronze strainer, with large area, 60-mesh screen. Easily dismantled and cleaned by removing one hexagon nut.

When you buy this quality valve you buy *service*—not service *calls*. Put it to work on those pans where other valves have failed and *see the difference*. Coupon brings facts and prices.

McDONNELL & MILLER, 1320 WRIGLEY BUILDING

McDONNELL No. 87 Humidifier Pan Control

COUPON BRINGS FACTS

McDonnell & Miller, 1320 Wrigley Building, Chicago
Send the facts about new No. 87 Water Level Control for Humidifier Pans.

Individual_____

Firm_____

Street and Number_____

City and State_____

Konzo— Forced Air Facts

(*Continued from page* 50)

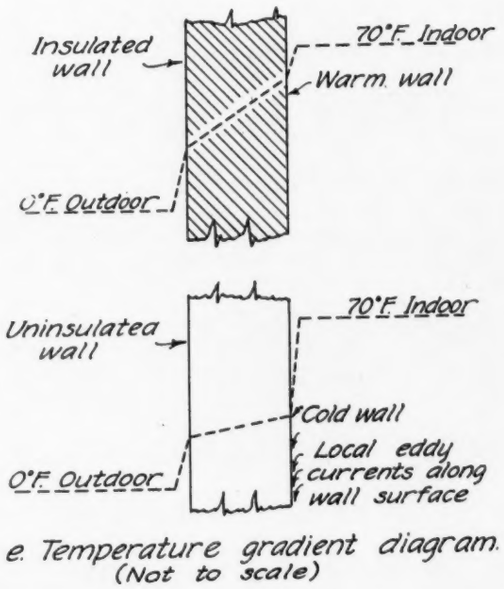


Fig. 1E—Inside walls of insulated houses show temperatures nearly equal to room temperatures, but in insulated walls the inside wall surface may be more nearly the temperature of the outside air.

and the heat lost by convection to the surrounding air. In other words:

$$H_T = H_R + H_C \qquad (3)$$

where H_T = Total heat transmitted in B.t.u. per hr. per sq. ft. of surface,
H_R = Heat transmitted by radiation, B.t.u. per hr. per sq. ft.
H_C = Heat transmitted by convection, B.t.u per hr. per sq. ft.

The semi-empirical equations which Heilman recommends for engineering practice are as follows:

For Convection.

$$H_C = C \times \left(\frac{1}{D}\right)^{0.2} \times \left(\frac{1}{T_{avg.}}\right)^{0.181} \times \Delta t^{1.266} \qquad (4)$$

where "C" is a shape factor as follows:

Horizontal cylinders	= 1.016
Long vertical cylinders	= 1.235
Vertical plates	= 1.394
Horizontal plates facing upward	= 1.79
Horizontal plates facing downward	= 0.89
Spheres	= 1.82

"D" is the diameter of the cylinder or the height of the plate, in inches.

"$T_{avg.}$" is the average of cylinder and ambient temperature, deg. F. absolute.

"Δt" is the temperature difference (deg. F.) between surface and air.

Also, for Radiation.

$$H_R = 17.23 \times 10^{-10} \times e(T_1^4 - T_2^4) \qquad (5)$$

where "e" is the emissivity coefficient for the surface, as follows:

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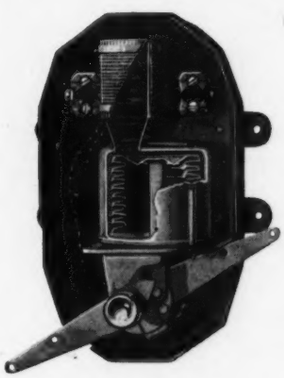

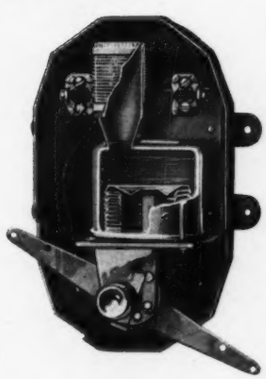

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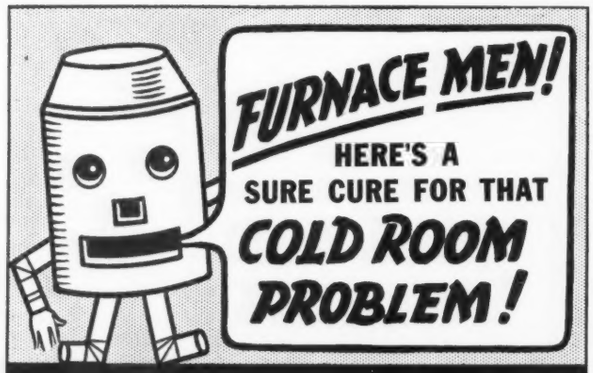
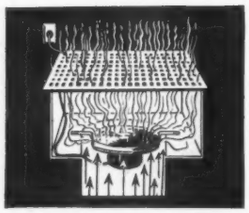


VICTOR HEAT BOOSTERS



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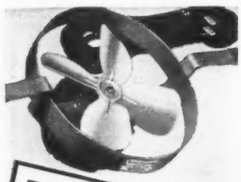

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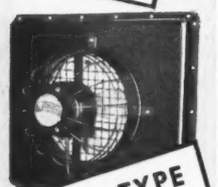

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(Values shown for 100 deg. F.)

Polished silver	= 0.022
Polished brass	= 0.096
Aluminum surfaced roofing	= 0.216
Black lacquer	= 0.80
White lacquer	= 0.80
Asbestos paper, brick, wood, cloth, paper, paint	= 0.93
Lampblack	= 0.945
Rough steel plate	= 0.945
Flat black lacquer	= 0.96

"T_1" is the temperature of the radiator in deg. F. absolute.

"T_2" is the temperature of the receiver or surroundings in deg. F. absolute.

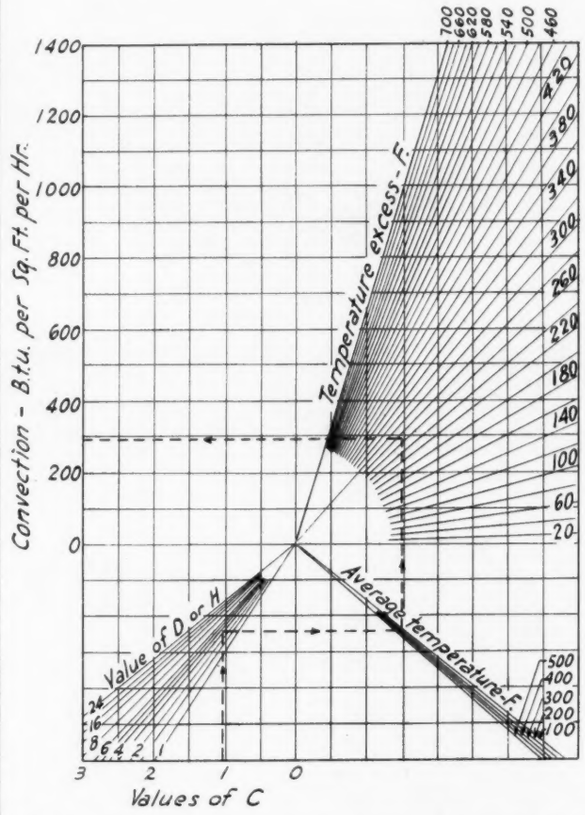

Fig. 5—Chart of heat transmission by convection. (By R. H. Heilman, Mellon Institute of Industrial Research. Trans. A.S.M.E., May, 1929.)

Example

A galvanized iron duct 10 in. in diameter carrying air at 180 deg. F. has a surface temp. of 160 deg. F. The surrounding air and walls are at 70 deg. F. The duct is horizontal. What are the losses by radiation and convection?

Solution of Example

For convection loss (see equation 4).

Shape factor, C = 1.016.

Diameter, D = 10 in.

$T_{avg.}$ = 1/2 (160 + 70) = 115 deg. F., or:

$T_{avg.}$ = 115 + 460 = 575 deg. F. absolute

$\triangle T$ = 160 — 70 = 90 deg. F.

By substituting these numerical values in equation 4,

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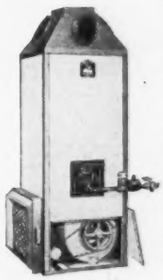

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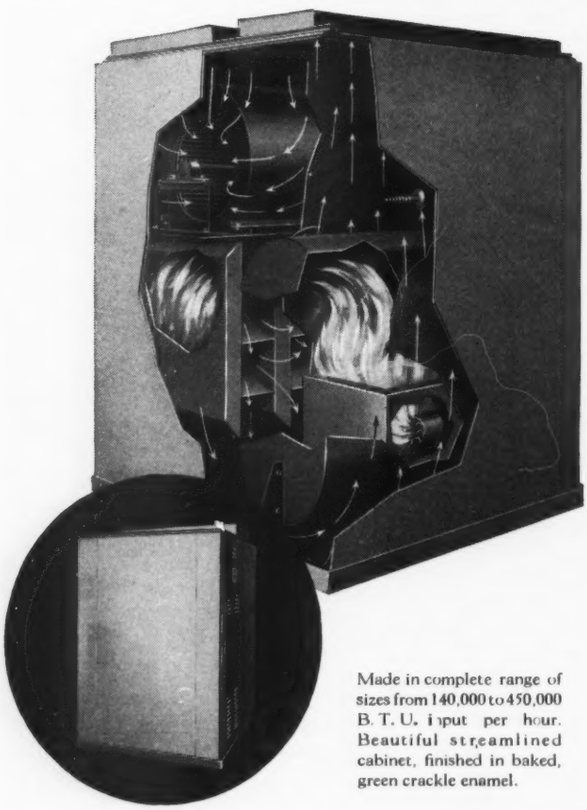

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$$H_C = 1.016 \times \left(\frac{1}{10}\right)^{0.2} \times \left(\frac{1}{575}\right)^{0.181} \times 90^{1.266}$$

$= 1.016 \times 0.631 \times 0.3168 \times 298.0 = 60.6$ B.t.u. per hr. per sq. ft.

For radiation loss (see equation 5).

Emissivity coefficient, e, 0.10 assumed. (For galvanized iron, bright.)

$T_1 = 160 + 460 = 620$ deg. F. absolute.

$T_2 = 70 + 460 = 530$ deg. F. absolute.

By substituting these numerical values in equation 5, the following results are obtained:

$H_R = 17.23 \times 10^{-10} \times 0.10\ (620^4 - 530^4)$

$= 17.23 \times 0.10 \times 6.89 = 11.87$ B.t.u. per hr. per sq. ft.

For total loss (see equation 3).

$H_T = 60.6 + 11.9 = 72.5$ B.t.u. per hr. per sq. ft.

Simplified Chart

Heilman has derived two charts which enable the engineer to readily determine the total heat loss from various surfaces. These charts eliminate all calculations for surface temperatures up to 700 deg. F. It

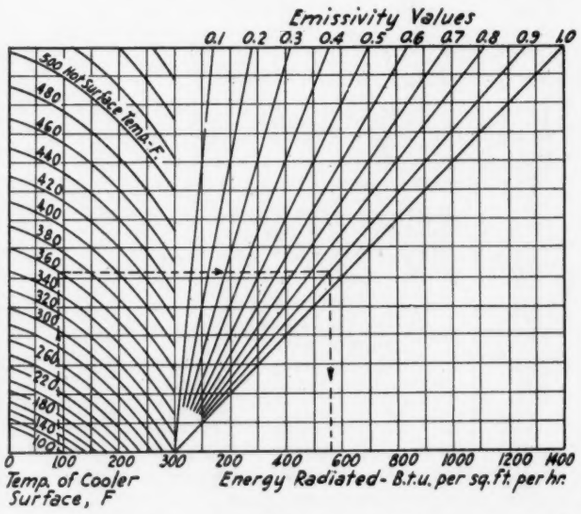


Fig. 6—Chart of heat transmission by radiation. (By R. H. Heilman, Mellon Institute of Industrial Research. Trans. A.S.M.E., May, 1929.)

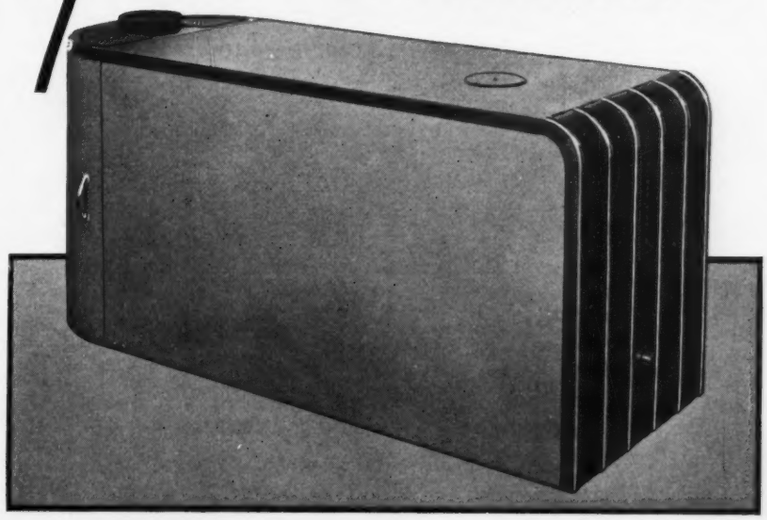
may be noted that the values of heat loss may be determined for various shapes and for all values of the emissivity coefficient.

The convection loss can be determined from Fig. 5, while the radiation loss can be determined from Fig. 6. The dotted lines and direction arrows placed on the two figures show the method of determining the total heat loss for the following example.

Given—A horizontal cylinder of black iron 3 inches in diameter. The surface temperature of the cylinder is 360 deg. F. and the room temperature is 90 deg. F. The temperature excess is equal to 360 — 90 deg. or 270 deg. F., and the average temperature is 1/2 (360 + 90) = 225 deg. F. The emissivity coefficient is assumed to be 0.9. The shape factor, C, for a horizontal cylinder is 1.016.

The convection loss, as determined from Fig. 5, is equal to 298 B.t.u. per hr.; the radiation loss as determined from Fig. 6 is equal to 560 B.t.u. per hr.; or a total loss of 858 B.t.u. per hr. is shown.

Great Possibilities



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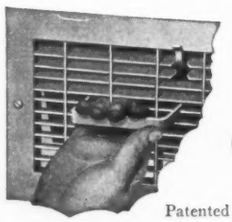

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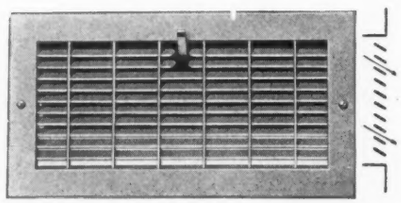

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Physical Comfort in Air Conditioning

(*Continued from page* 54)

or summer, comfort zone. Without humidification heat will be needed to maintain 82-degree dry bulb in the winter while cooling from 110 to 94-degree dry bulb will be necessary in the summer for comparatively still air. Here air motion would not be desirable.

If humidification were employed to put moisture into the air and thus raise the relative humidity the solution of the problem changes. The extent of the change is appreciated when it is realized that lowering the temperature 16 degrees in still air for the summer would mean raising the humidity, without mechanical means, from 20 to 33 per cent. Now humidification for 40 per cent throughout the year, with 100 fpm. will require heating to 78 degrees in the winter and cooling to 90 in the summer. As the comfort line charts presented do not cover 40 per cent all that is necessary is to figure the problem, in the case of humidification, for 20 and 100 per cent and then estimate the results for 40 per cent.

Interrelation of Factors

It must not be overlooked that these comfort line charts, and also the comfort charts, can be used to solve heating as well as cooling problems. This is specially true since low humidities and high winds provide natural weather which can be met, within doors, by raising the relative humidity and lowering the air motion. Judicious application of the principles of cooling and heating for comfort will very often reduce the fuel bills for winter by making low dry bulb temperatures possible.

Of course it is no secret that changes in the dry bulb temperature produce as noticeable heating and cooling effects as those furnished by humidity and air motion. Figs. 3 and 4 show that statement is true. With these three factors to vary, an unlimited number of combinations can be secured for any degree of comfort desired. Also, it is evident that, where an extreme condition of discomfort exists, it is often possible to secure improvement, by changing the comfort factors, even though the resultant temperatures, air movement and humidities do not lie in the comfort zone.

Consideration of the changes in the comfort lines in Figs. 3 and 4 will show that the greatest cooling effects of air motion are obtained between 30 and 350 fpm. and that neutral lines of comfort lie, for 100 per cent relative humidity, approximately on the 100-degree dry bulb line and, for 20 per cent, approximately on the 136-degree dry bulb line. It is evident that the effect of any one of the three factors, from a heating and cooling standpoint, varies considerably with the variation of the other two factors.

Clothing plays a part, already noted, in the heating and cooling effects of air. In fact we might consider it an insulation which is increased for cold weather and decreased for warm weather. In Fig. 5 these effects are specially noted. Here the comparison, with men stripped to the waist and normally clothed, is be-

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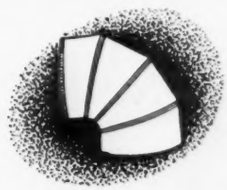

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Lamneck is the only company providing Service Helps of this kind. They are but one more step in our program of constant research to find new ways to reduce the cost of duct and fittings, and to help the manufacturer, jobber, and dealer to make greater savings in time and money—and to make greater profits.

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The Lamneck Service Helps described above may be obtained from any authorized Lamneck jobber, or by writing direct to the factory.

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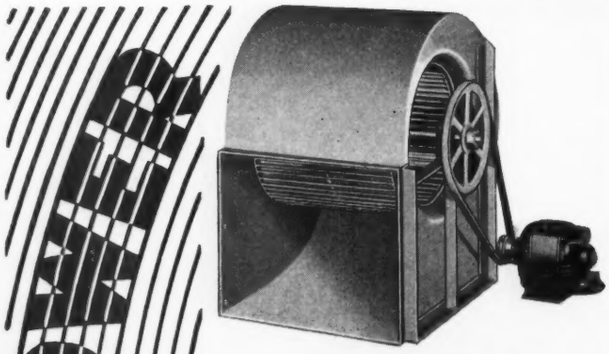

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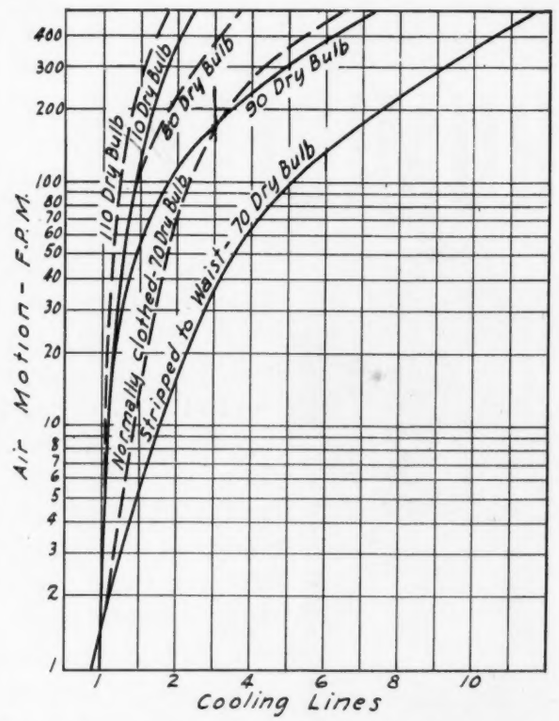

Fig. 5. Increasing air temperatures and the amount of clothing worn decreases the cooling effect of air motion.

tween the amount of cooling and the dry bulb. The greatest effect is found for the lowest dry bulb shown of 70 degrees. In the tropics, deep mines and steel mills the question of clothing is important from a comfort standpoint. One interesting point connected with this chart should be mentioned in passing. The cooling effect for men normally clothed at 70 dry bulb is not so different from that for men stripped to the waist at 90.

The effect of air on work produced may be seen in Fig. 6. Here work is based on the foot-pound. This unit is quite small as it takes 33,000 foot pounds to equal a horsepower. For the same dry bulb there is a noticeable difference in the effect of relative humidity on the amount of work which can be performed. Furthermore, we notice the same neutral points, where the still air and moving air lines cross at particular dry bulb temperatures, due to the relative humidity. It seems rather odd that the greatest difference in work produced, between still and moving air conditions for the 60 and 30 per cent relative humidities, are found at 120 degrees dry bulb and for 100 per cent at 110 degrees. Another interesting point is that an effort equal to 200,000 foot-pounds of work seems to be a limit for any humidity at high temperatures. These curves make it possible to understand why the increase in humidity and temperature caused a decrease in mine production. For example, suppose the hourly production output at 60 per cent relative humidity and 113 degrees dry bulb was obtained with an effort equal to 80,000 foot-pounds of work. If the relative humidity rose to 90 per cent and the temperature to 120 degrees it is easy to see that, with moving air, the work done would be not more than half that under the first condition.

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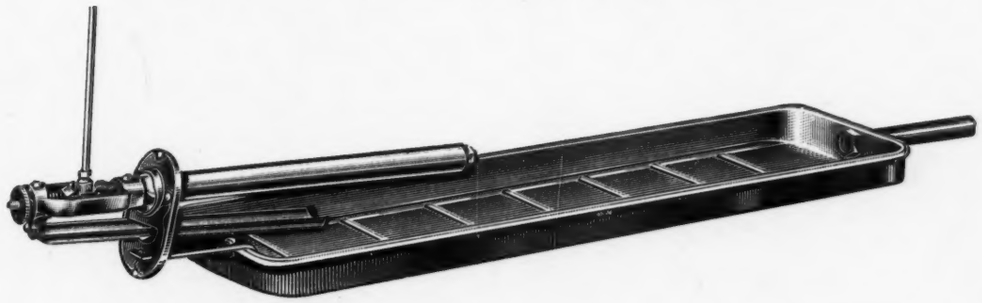
WITH A STAINLESS STEEL PAN 8x34 INCHES



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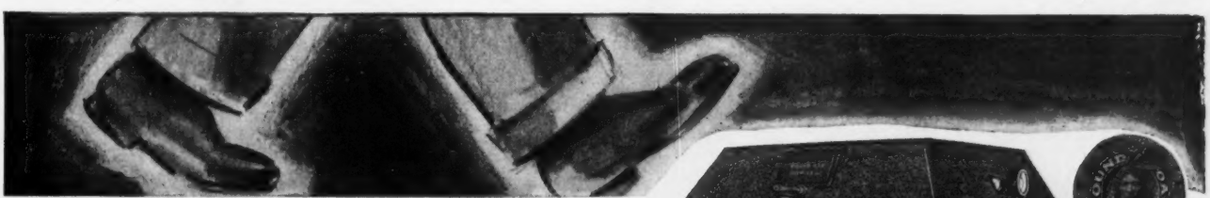

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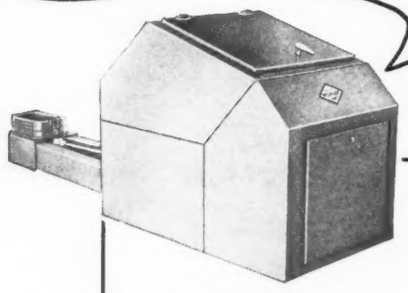

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Clarage Furnace Fans (complete assemblies) combine many advantages. They are positive centrifugal type, very compact, highly efficient, and the low speeds insure SILENT OPERATION.

Clarage Fan Company, Kalamazoo, Michigan

CLARAGE
Air Handling and Conditioning Equipment

A few years ago, when comfort work was first started, it was believed that the wet bulb temperature had the greatest influence on comfort. Turning back to Fig. 2 we notice that the wet bulb does not begin to parallel comfort lines until points above the neutral line, which we know is a comfort line from Figs. 3 and 4, are reached, so that the fact is that the wet bulb does control comfort at high temperatures. From the two charts just mentioned it will also be found that the dry bulb gradually assumes a controlling influence as the dry bulb temperatures rise toward 100 degrees. From what we already know as to the influence of humidity and air motion it can be safely said that no one weather factor plays a predominating part in furnishing human comfort but that each one does

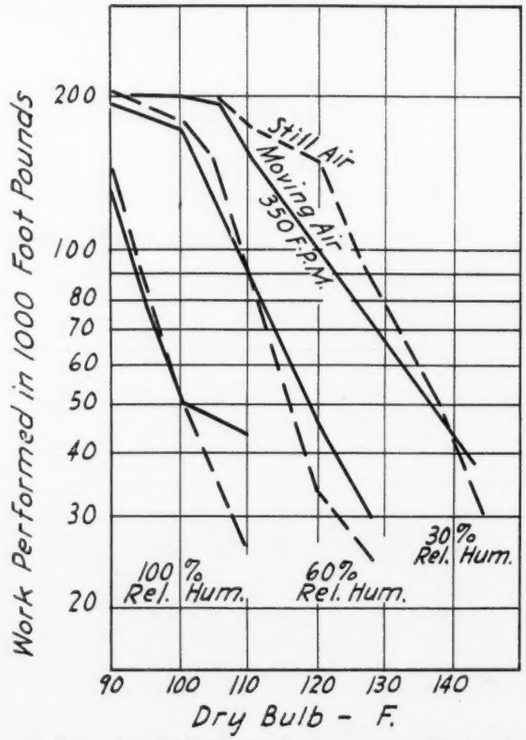

Fig. 6. Lowering high temperatures and relative humidity reduces fatigue and thus increases man's ability to work.

have a particular sphere of influence. These spheres found in the charts shown are of value in figuring comfort jobs.

The reason for differences in the amount of work performed, as indicated in Fig. 6, is the fatigue caused by various weather conditions. As dry bulb temperatures and relative humidities rise and as moving air is increased in speed, for conditions above the neutral point, men at work require more frequent and longer rest intervals because of the distress caused by the increasing discomfort of the surrounding atmosphere. Where high temperatures and humidities are, therefore, necessary in the work conducted within a building to be cooled or airconditioned it will be wise to use as low temperatures and humidities as are possible.

Furnishing comfort is, then, a vastly different thing than providing a working heating system. While the combinations of weather which will solve a given problem may be numerous there is usually only one or two solutions best for the people involved.

MULTI-BLADE EXHAUST FANS

Built by Peerless for Quietness and Efficiency

Silent capacitor motor—low starting current; totally enclosed.

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Multi-blade fan—exclusive design that moves a large volume of air quietly, efficiently.

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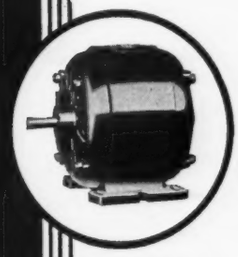

The dealer or heating contractor installing an air conditioning system is not an electrical expert. Neither is the home owner; and the conditions under which the motor must work are sometimes far from ideal.

We know all these things from experience and from study in building motors for several of the largest manufacturers of air conditioning systems in the country.

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Your customers have more money to spend . . . and they are becoming control-conscious! Don't miss this opportunity to cash in on some nice profits . . . get ready NOW for the coming heating season!

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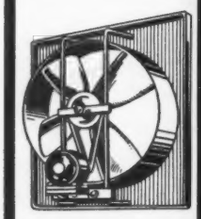

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Instantaneous-Direct Reading Air Velocity Meter
20 FPM to 6000 FPM
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SUPREME Spray HUMIDIFIERS

For Warm-Air Furnaces. Especially effective with oil burners, stokers and circulating fans.

ATOMIZING SPRAY NOZZLES (self-cleaning) for Humidifying and Air-Washing.

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MAUREY Pulleys on your stoker or blower, are insurance against pulley breakdown. These famous pulleys never loosen or pull apart. NO DIE CAST HUBS are used in their construction. Write today for complete literature.

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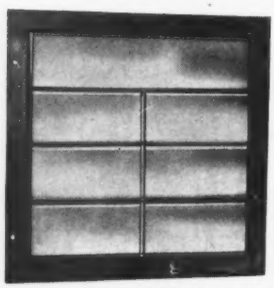

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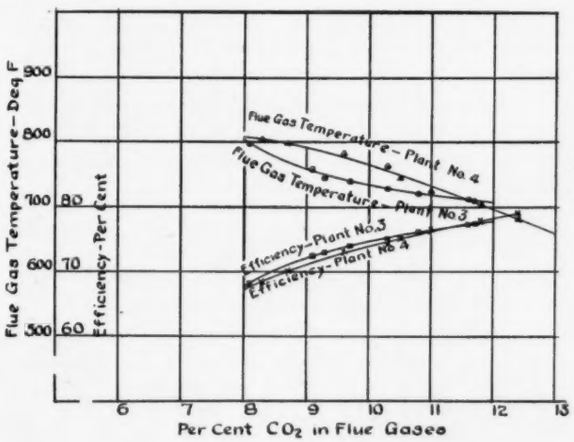
Oil Burner Efficiency Ratings

(*Continued from page* 56)

cipal constituent of fuel oil is carbon which unites with oxygen to burn to CO_2. Depending upon the carbon content of the oil a certain volume of air is required to supply the oxygen for combustion. It is apparent that the least amount of air supplied to provide this oxygen will give the least volume of gases in the combustion process and consequently the volume percentage of the CO_2 for this condition will be highest. As air is added above that theoretically required to supply the oxygen for combustion (excess air) the percentage by volume of CO_2 is reduced. As excess air is added the CO_2 percentage decreases and the combustion efficiency also decreases. It is not practical to attempt to supply only the exact required air because this would require perfect mixture of fuel and air. It is the goal of burner designers to improve the means for mixing the air and oil in the combustion chamber so as to reduce the excess air to a minimum and raise the CO_2 to a maximum and thereby attain maximum combustion efficiency.

The Minimum CO_2

A generally accepted minimum CO_2 standard is 10 per cent. With a 10 per cent CO_2 content there is 50% excess air in the products of combustion or, in other words, one and one-half times the theoretically required air is introduced to the fire. The analysis of a typical No. 3 oil is as follows: carbon 82.18%; hydrogen 12.32%; nitrogen .09%; sulphur 2.71%; oxygen 2.70%. The theoretically maximum CO_2 content in the combustion of this oil is fractionally more than 15%.



As an illustration of the importance of the CO_2 content of the products of combustion in its relation to boiler or furnace efficiency the curves of the results of tests on two steam boilers are shown. Both of these boilers are overloaded and were fired with pressure atomizing (gun) burners with fires too large for their rating. Both cases are therefore representative of what results may be obtained with the firing of conversion boilers that are sized no better or probably not as well as the average conversion boiler is for its load.

AUTOCRAT *Balanced Flame* OIL BURNERS

PROVED! by 9 years of Dependable Performance in the Warm Air Heating Field.

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AUTOCRAT OIL BURNER CORP.
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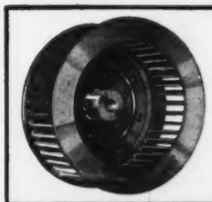

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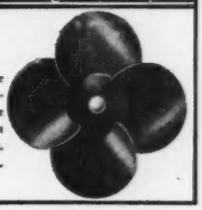

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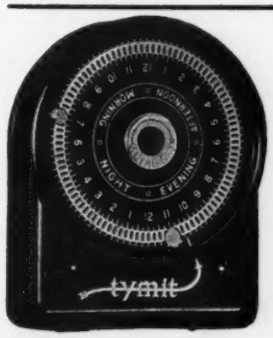

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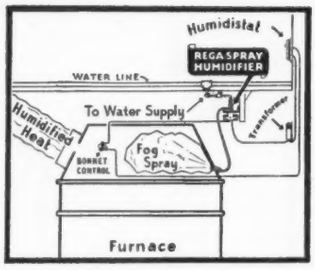

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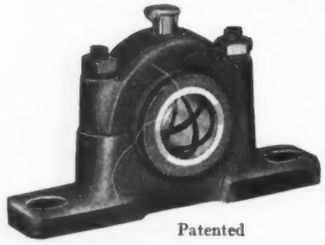

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Self-lubricating, self-aligning, trouble-free, long-lasting, quiet . . . Randall Standard Pillow Blocks have answered the bearing problem for the whole air conditioning field. Let us give you the proof. Write for literature, sizes and prices.

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DEPENDABLE—PROFITABLE

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ONE PIECE CASTING
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The efficiency shown is the indirect efficiency obtained from an analysis of the flue gases and reading of the flue gas temperature. The gases were analyzed with an orsat apparatus and no combustibles in the flue gases were indicated. A deduction for boiler radiation losses should be made from the values shown in order to obtain the net efficiency at the boiler outlet. The test readings from which the curves were plotted are as follows:

Plant No. 3—2.00 Gal. Nozzle

CO_2	*Flue Gas Temp.*	*Eff. %*
11.7	710	77.5
11.6	712	77.25
10.8	720	76.0
10.3	729	75.0
9.7	738	74.0
9.3	744	73.0
9.1	758	72.5
8.1	797	68.0

Plant No. 4—1.35 Gal. Nozzle

CO_2	*Flue Gas Temp.*	*Eff. %*
12.4	680	79.0
11.8	703	77.75
11.0	722	76.5
10.5	744	75.0
10.3	761	74.0
9.6	780	73.0
8.7	798	70.0
8.3	804	68.25

If a boiler radiation loss figure of five per cent is taken, and this is ample, these figures show that, even when firing a boiler beyond its rating in order to handle an overload condition, a satisfactory efficiency and consequently good economy of operation can be obtained when the burner will fire with good combustion efficiency. On the other hand, with CO_2 readings in the range of eight per cent a great falling off in efficiency and an unfavorable cost of operation results. The slope of the curves shows the rate of decrease in stack temperature and increase in efficiency with increases in CO_2.

Dealers should determine that the burners they are selling are capable of firing at good combustion efficiency and that the burners after installation are adjusted to fire at good efficiency.

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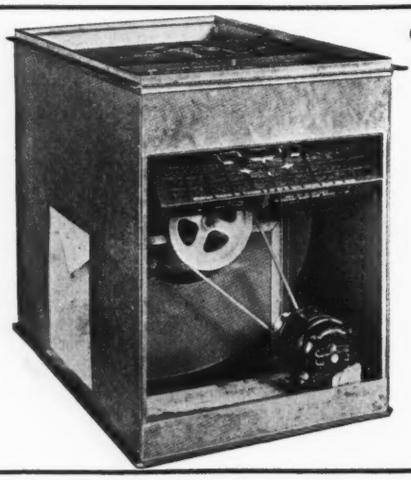
DEALER'S PRICE
$56.00

No. 1601 furnished with Minneapolis Furnacestat and three filters.

1225 c.f.m. Filtered Air



"Quiet as a Cat's Purr"

—and as efficient as the well known Am-Pe-Co Rotary, and Air Washer-Blower for winter air conditioning with 7 years successful product performance.
Dimension No. 1601—
34"x27"x35"
For winter air conditioning use the Air Washer-Blower.

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MARSHALLTOWN IOWA

SUNBEAM'S *Complete Line* of FURNACES *and* AIR CONDITIONING UNITS

For every home . . . large or small
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Cast Iron Furnace

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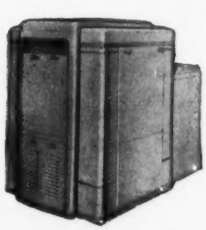
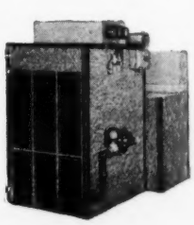
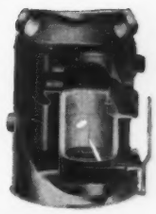
(A F Series)



Series D Gas-Fired
Air Conditioning
Unit



Series C
Gas-Fired
Air Conditioning Unit



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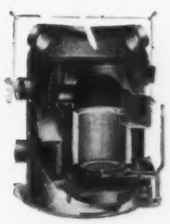

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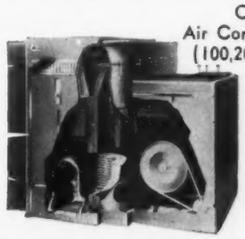

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FLANGED OPENING FOR INLET PROVIDED
FOUR FILTERS OF A NATIONALLY KNOWN MAKE ...COMPLETE ACCESSIBILITY
SPLIT CONSTRUCTION ...SAVING ON INSTALLATION in TIGHT PLACES

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14" Hy-Duty Blower, Forward Curved Multi-Vane Type

Capacity Far in Excess of Requirements...Slow Speed... Quiet Operation

Blower Bearings...Self Aligning, Self Oiling, Rubber Mounted

Heavy Gauge Rust Resisting Steel Throughout

Motor Integrally Mounted...Rubber Cushioned... Variable Speed Pulley...V-Belt

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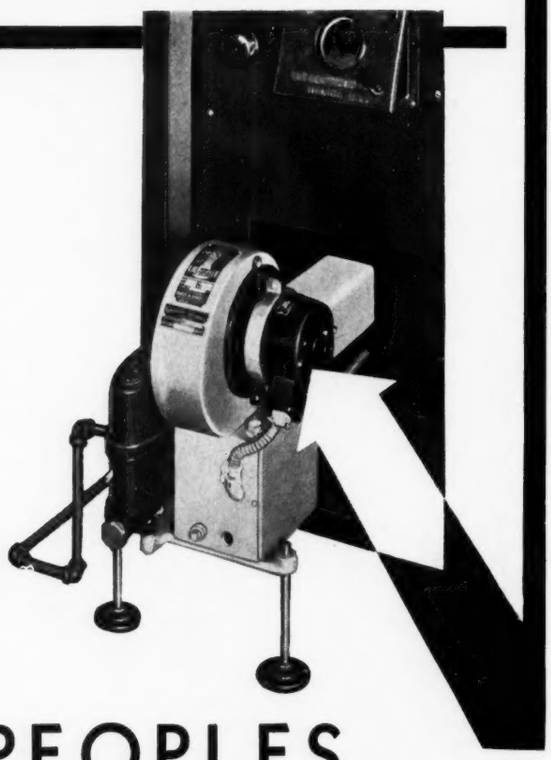
BLOWER DIVISION
FAN STREET.... INDIANAPOLIS, U.S.A.

FOUND

An Ideal Oil Burner for Forced Air Heating and Winter Air Conditioning Systems



PEOPLES

is the name of the perfect oil burner found after years of testing and experimenting to be THE OIL BURNER for forced air and winter air conditioning. It has 8 features which make it the one burner for such installations:

No. 1. It avoids sudden changes in firebox.

No. 2. It is self contained.

No. 3. It can fire as low as ¾ gallons of oil per hour efficiently.

TODAY
WRITE FOR COMPLETE DETAILS

No. 4. It is simple to install.

No. 5. It is low in cost.

No. 6. It is quiet.

No. 7. It needs little if any service.

No. 8. It has no gadgets.

PEOPLES OIL BURNER CO.
466-A W. SUPERIOR ST. CHICAGO

Friction Chart

G. A. Voorhees,
American Artisan:

Thanks for your January and June articles in the Artisan. I have been designing duct systems which our company has installed on the equal friction loss method for quite some time, sizing my ducts from the Standard Friction Chart. While we have experienced no trouble, I really believe that the use of your revised chart will result in better operation.

There is one point, however, that I have never had perfectly clear in my mind, and I suppose I won't get it cleared until I ask some dumb questions of someone who has a better engineering knowledge than I have.

In calculating the length of a duct or branch to a second floor room, is it necessary to include the length of the riser or wall stack in the total length? Or is the accelerated movement of air in a perpendicular stack sufficient to offset friction loss? Also how would you advise treating offsets, or run-outs at the second floor level of riser pipes?

C. D. S., Ohio.

Reply by
G. A. Voorhees,

Glad to know that you found the articles on friction pressure chart in the recent issues of the American Artisan to be of interest, and I'm sorry I can't give you definite and authoritative data on the effect of air temperature on friction pressure loss.

All of the tests made at the University of Illinois having to do with performances of wall stacks indicated that the stack produces a definite suction effect. You'll find much of this information boiled down in the interesting book "Gravity Warm Air Heating" recently published by the National Warm Air Heating & Air Conditioning Association.

From the data there presented, it is evident, I think, that if we design our forced air systems for relatively high register air temperatures (say 160°) and relatively low air velocities in the risers (probably 400 f.p.m. or less) the aspirating effect of the riser can always be counted upon to offset to a considerable extent the friction pressure loss in the riser.

In the days when most of us who were active in fan heating work were using propeller type fans and correspondingly large pipes, We usually got by in estimating the static pressure of the system by ignoring the friction pressure loss in straight risers (but not in risers having offset or run-outs at the second floor level).

In my own work, I consider the stack as a part of the run in estimating static pressure on any job designed for a register temperature of 140 or 150° and an air velocity in the riser of 400 f. p. m. or more. But please keep in mind that this is merely a personal preference and it's possible that if you will write to Mr. S. Konzo, in care of the American Artisan, he may be able to give you more authoritative information on this point.

The greatest 'concession" which I make is to assume that a 90° stack elbow is equivalent to five running feet of pipe instead of ten feet and I don't even do that unless I'm reasonably sure that a good installation will be made. Slip shod sheet metal work and careless construction of stack elbows and fittings produce some surprising shock losses and whenever I don't personally know the installer and have some direct knowledge of the plant and the building in which it is installed, I prefer to arbitrarily assume that a stack elbow produces as much friction loss as ten running feet of pipe.

Even though we know that **to some extent** the suction effect of the riser helps to offset friction pressure loss, I don't believe we are warranted in taking this into consideration in calculating the static pressure **of ordinary residence jobs** until a more complete collection of thoroughly reliable data is available.

I've never found anything in Bulletin No. 266 of the University of Illinois Eng. Experiment Station which covers tests of the forced air system in the Research Residence that would seem to warrant a correction for the suction effect of stacks. On the contrary, they found that with an air delivery of 2300 C.f.m. which is not unreasonable for a system such as that at the Research Residence, the actual pressure loss on the warm air side of the system was 0.185, whereas their carefully calculated loss was only 0.078. They point out that there are evidently more elements of uncertainty on the warm air side of the system than on the return air side. When that uncertainty means, as it did in the case of the tests of the forced air system in the Research Residence, that the actual pressure loss on the warm side of the system is 137% **greater** than was calculated, it would seem to indicate the danger of "making allowances" for aspirating effect, because it's evident that the unanticipated shock losses much more than offset the "chimney effect" of the risers.

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Heat Loss Coefficients

American Artisan:

Can you furnish us the latest heat loss coefficients (K) for the following constructions—

1—Wall; brick veneer, sheathing, 4 inches Rock Wool, rock lath, plaster?

2—Ceiling; plaster, rock lath, 4 inches Rock Wool?

A. D., Ohio.

Reply by
the Editors

The A. S. H. V. E. Guide for 1936 does not give any heat loss coefficient for brick veneer, sheathing, 4 in. Rock wool, rock lath and plaster, but they do give a coefficient for this wall using metal lath instead of rock lath, as 0.062.

The Guide does not give any coefficient for your ceiling construction, using rock lath, but does give a coefficient for metal lath of 0.067.

We believe that you are safe in using either one of these coefficients as the rock lath does not seem to be considered an insulating material and the heat transfer of metal lath will probably be just about the same as plaster board. The guide carries a footnote stating that these materials do not alter the value given.

The Warm Air-Fan System of Heating and Ventilating for Large Buildings

By Platte Overton
Chief Engineer, The Furblo Co.

FACTORY heating offers none of the problems experienced in church or public hall heating and ventilating. Factories generally have sufficient room for heaters, fan and duct work, and the erection of these ducts is comparatively easy.

In the past generation, most factories required power and had steam boilers and engines. The exhaust steam was used for heating. Modern factories use electric motors and heating systems of some description are necessary.

Three methods of heating will be discussed in this article. These different methods are evident at a glance of the floor plans in Figs. 1, 2 and 3. In the design of a warm air fan system for factory heating, the basic principles of a hot blast system are used. Recent tests and investigations have shown a more general trend toward the unit type in heating industrial works. This type is shown in Fig. 5. These units may be fired by oil burners automatically controlled.

In this series on heating larger buildings the author will discuss the apparatus used and engineering involved. In this article he takes an open factory, figures the heat loss and outlines three possible heating systems. Floor losses, infiltration, wall construction, C. F. M. and register temperature are discussed

◆

The method of installation in factories or industrial works depends largely on the conditions. Where factory employees sit at benches or machines and are not bodily active, distributing ducts are necessary to minimize drafts. Openings approximately 10 feet above the floor and spaced not more than 25 feet apart should be provided. In foundries, machine shops, auto body works and in all industrial buildings where men are engaged in heavy or semi-heavy labor, units may be installed without ducts and the air for heating blown as far as 250 feet. Outlet velocities in such cases depend on the height of the ceiling and the distance the air must be blown.

While trained arrows are generally prevaricators and exist only to show where the designer hopes the air will go, the disciplined missiles in Fig. 5 show the attempt at control of the distribution by the use of the diffuser shown in Fig. 4.

Before proceeding with the data sheet, it should be pointed out that all the designs and their application in the following problems are for highly competitive work. The contractor must meet the figure of unit heater competitors, and must figure such work accordingly. When the word "competitive" calculations is used it refers to the following items: The register temperature of 145 degrees is a maximum. If we were to set the register temperature at 120 we would require more air, hence a larger fan and larger ducts. The room temperature is based on 65 and the heaters on a high combustion rate hence they are smaller.

Where higher room temperatures, or certain atmospheric conditions must be maintained due to the material being handled in the factory, the problem becomes more or less one of air conditioning and reliable engineers should be consulted. The following figures on the data sheet

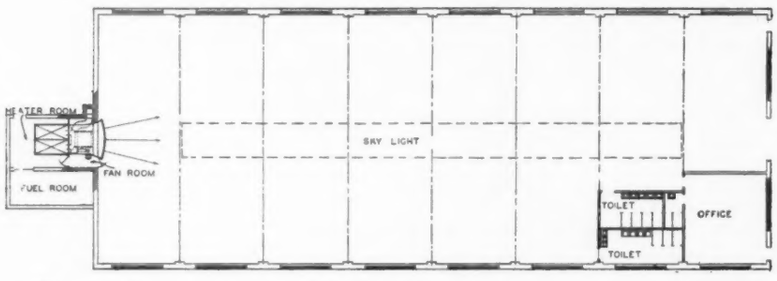


Fig. 3—Above is shown a "blow in" system with heater at one end. The text explains velocities and air distribution required.

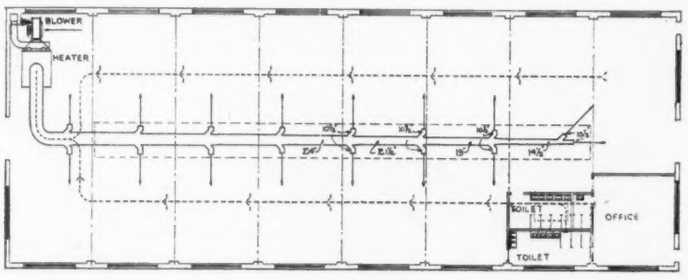


Fig. 1—Right is shown a duct system with stubs and registers to direct air to outside walls. A single trunk and a double trunk are indicated.

must be taken as a maximum with no factor of safety.

The data sheet Fig. 7 is filled out for the building shown in Figs. 1, 2 and 3. However, we will go over each item in detail and explain how the included figures were obtained. The office and toilet rooms will be omitted as these areas are radiator heated. These rooms have ceilings 10 feet high and the area over them is open to the factory section and roof loss must be figured for the factory.

Data Sheet

Our first items are 1-2-3 and are room dimensions cubic feet of space and floor area.

Item 4 is floor constant and factor. We refer to any coefficient table and find that our floor coefficient (constant) for concrete is 0.50. For our factor we multiply this constant by the temperature rise. We assume the ground to be 45 degrees and our room temperature is 65 or 20 degree rise. $0.50 \times 20 = 10$ for our factor.

Item 5 is ceiling constant and factor. Our roof is 2-inch wood under composition roofing and from coefficient tables we find our constant is 0.35. Our temperature difference is 0 degrees outside to 65 inside equals 65×0.35 equals 22.75 for our factor item 5.

Item 6 is window constant and factor and our glass coefficient constant is 1.2. Our temperature rise is 65 hence 65×1.2 equals 78 for our factor item 6.

Item 7 is wall constant and factor, this wall is 13 inch brick not plastered and our coefficient or constant is 0.278×65 equals 18.07 or 18 for our factor item 7.

Item 8 is exposed sash and door perimeter and is the linear feet of window or door edge where infiltration may take place. These edges are shown for the windows in Fig. 8. The total window and door edge equals 548 feet. We need figure only on one-half of this footage as the windows on the windward side will not be affected. Hence ½ of 548 equals 274 for item 8. References state that window edge of sash are usually estimated at a leakage of 124 cubic feet of air per linear foot of crack. The B.t.u. loss per foot becomes: 124 × the emperature rise

$$\frac{\qquad}{55} =$$

$$\frac{124 \times 65}{55} = 146 \text{ for item 9.}$$

Item 10 is exposed wall gross area and is obtained by multiplying the running wall by the height.

Item 11 is exposed window area and is the total glass and door area of the exposed wall.

Item 12 is net wall area and is

(*Continued on page* 116)

Fig. 7
This is a data sheet so designed that the losses for areas subject to transmission are itemized according to the heat loss coefficient and total loss for inside temperature. When completely filled in the sheet insures consideration of all possible heat losses.

DATA SHEET File No.

Based on 0 °F. Cold Weather & Prevailing Winds From N.W

N 30 % NE 25 % W 30 % E 15 % SW 20 % SE 10 % S 5 %

Exposure Factors

Bldg. FACTORY Date

Dist No.

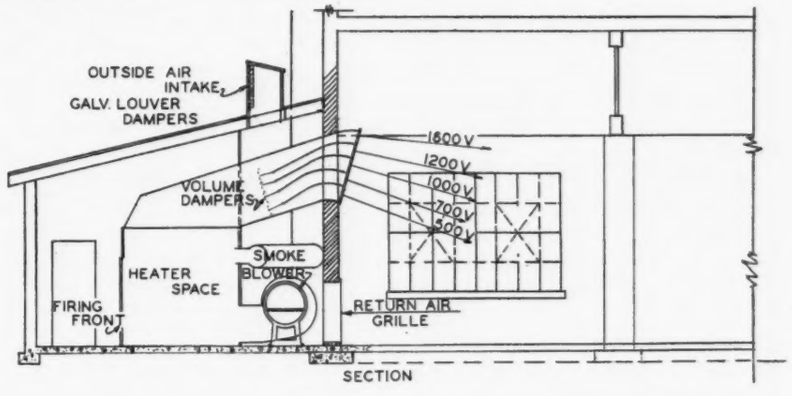
or Loc. Twp. Co.

Bldg. H. & V.

Archt. Engr.

Rooms No.				
Use	FACTORY			
MEASUREMENTS				
1. Room Dimensions	60 X 58 X 18			
2. Cubic Feet Space	153360			
3. Room Floor Area	8520			
4. Floor Const. & Factor	50-10			
5. Ceiling Const. & Factor	35-22.75			
6. Window Const. & Factor	12-78			
7. Wall Const. & Factor	278-18*			
8. Exposed Sash and Door Perimeter, equiv.	274			
9. Leakage B. T. U. per ft. of Perimeter	146			
10. Expd. Wall Gross Area	6224			
11. Expd. Window Gross Area	1756			
12. Expd. Wall Net Area	4468			
13. Exposure Direction	NW 25%			
14. Room Temperature	65			
*Add 10% for sky light				
HEAT LOSSES				
15. Wall Loss B. t. u. per Hr.	80474			
16. Window Loss B. t. u. per Hr.	270506			
17. Subtotal Loss B. t. u. per Hr.	900530			
18. Expos. Allow. B. t. u. per Hr.	73232			
19. Floor Loss B. t. u. per Hr.	32200			
20. Ceiling Loss B. t. u. per Hr.	169464			
21. Leakage Loss B. t. u. per Hr.	40000			
22. Total Heat Loss	617826			
23. Deduct for Heater Size				
24. Heater Building-loss Load				
SERVICE				
25. Air Supply C. F. M.	8250			
26. Recirculation C. F. M.				
27. Air Supply Inlet Temp.	145°			
28. Air Supply B. t. u. Service				
29. Direct Radn. B. t. u. Service				
30. Direct Radn. sq. ft.				
31. Grav. Ind. Radn. sq. ft.				
32. Aspir. Coils Radn. sq. ft.				

Fig. 5—Details of a unit system to be placed at one end and using high velocities for air carry. Either outside air or recirculation can be used as shown.



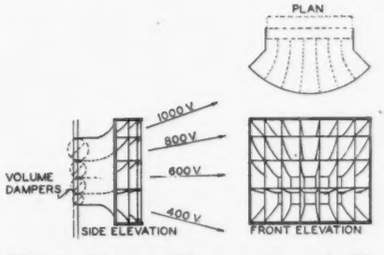
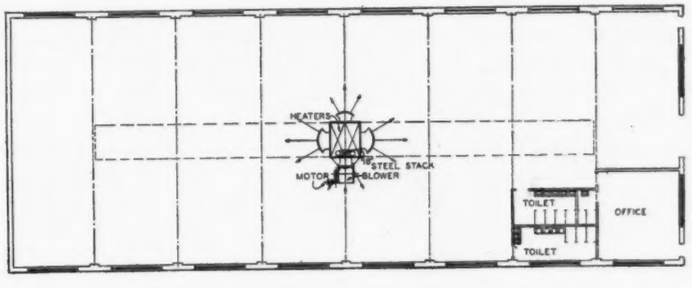


Fig. 4—Above. Shows a type of diffuser.

Fig. 2—Below. A central system of heating for floor or elevated mounting.



Welding Procedure for the Sheet Metal Shop

By J. Carl Wilson

A series of practical articles covering accepted welding practice for light gauge sheet and light structural shapes as used in the sheet metal shop for the fabrication of metal specialties, ventilating work, or general architectural practice. This fifth article covers the carbon arc process in which the arc is formed between the work and the carbon held in the welder. The drawing opposite shows details.

Manual Carbon Arc

IN previous articles we have discussed only metallic arc procedure; in this article we will deal with the carbon arc process. In manual carbon arc welding the arc is formed between the work and the carbon held in the electrode holder. The heat of the arc melts a small pool in the surface of the work to be welded, this pool is kept molten by playing the arc across it. Extra metal to form the weld is added by a filler rod similar to the process of oxy-acetylene welding. In many cases on light work, filler rod is not necessary, especially in edge welding.

Carbon arc welding is a puddling process and is not easily applicable to overhead and vertical welding, although with practice a very good, and in some cases a more economical weld, can be made in these positions if you start at the top and weld down on your material. Carbon arc may also be used as an economical cutting tool in many cases, particularly in dismantling an assembly or where a very smooth cut is desired.

For many welding operations, not only on steel but many other metals, the carbon arc process can be used to good advantage. For metals 16-gauge and lighter, 5/32-inch carbons are best. The carbon should be tapered back gradually for from 2 to 3 inches and it should be held in the holder as close to the point as practical. If the carbon is long between the holder and arc, it will vaporize and be used up very rapidly, causing excessive waste.

For 5/32-inch carbons, 50 amps. should be the maximum current, smaller current may be used. For 16 to 10-gauge, use 3/16-inch carbons, current 100 amps maximum, prepare carbons as outlined above. Polarity should be straight, or carbon negative, work positive.

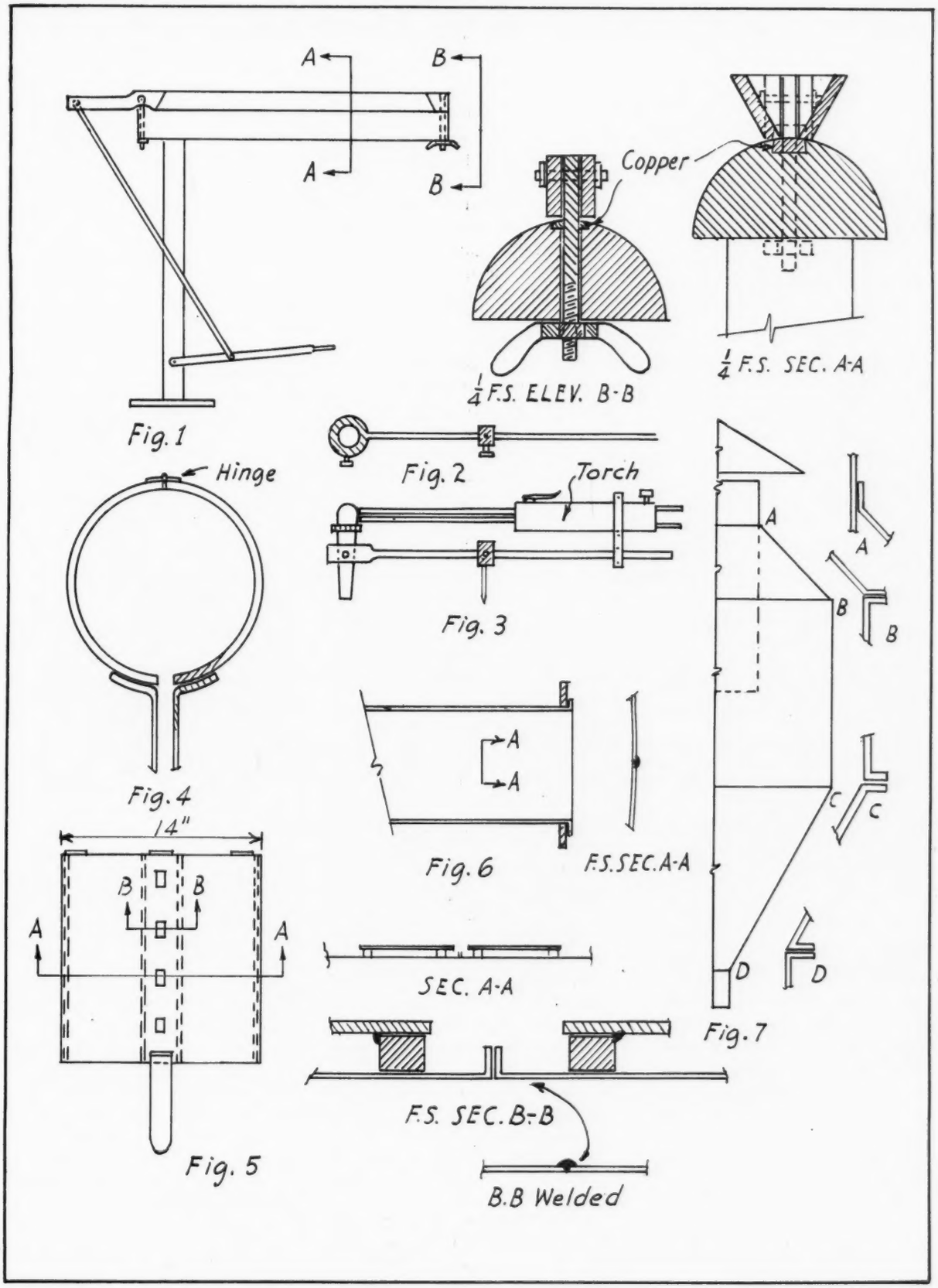
Blow Pipe Accessories

Welding offers many advantages in blow pipe construction. In almost every case it is necessary to taper every joint of pipe for lap, it is desirable to be very accurate with layout and punching and we have a lot of rivets to drive. If we apply welding we can effect quite a saving in labor owing to the fact we will cut our stock on the squaring shear and eliminate the tapering, laying out and punching. After the joints are rolled, a welder will weld two joints while a good mechanic rivets one. It is easy to see quite a saving up to this point.

With all collecting systems a smooth interior is highly desirable. In no other method of fabrication can we obtain as smooth an interior as by welding. Note details BB Fig. 5 and AA Fig. 6. With butt or edge type seams there is no lap or obstruction of any kind inside the pipe, allowing free flow of air, eliminating the hanging of materials, especially in systems handling waste, lint and other fibrous materials. Another advantage is elimination of excessive wear. No doubt most of us have at some time repaired system handling very abrassive materials and noted that all the wear was in the first 8 inches of each joint. This is caused by the fact that air passing over an obstruction of any kind does not immediately fill the larger area. When it does, we get a sort of bombardment action of the abrassives. In the lower pressure systems this wear is not so pronounced, but on high velocity systems where complete removal is desired from sand blasting machines, crushing plants, grinders, etc., this wear is excessive and in some cases reduces the life of the system 25 to 40 per cent.

Jigs

In Fig. 1, we have a jig for welding butt or edge type seam pipe. This jig, although similar to other jigs described in previous articles, is different in many ways it will be noted. Section AA double hold down bar and its shape are an example. The reason for the double holdown is—in collecting systems the butt or edge type seams are the best. Note adjusting bolt at hinged end of holdown bar allowing for different gauges of material. This jig can be made from an old mandrel by machine grooving and inserting a piece of copper as shown in details AA and BB. It is sometimes desirable to have sections of the pipe removable. One of the best methods is the flange bolt and gasket type. Jigs for cutting these flanges shown in Fig. 2, and Fig. 3. This consists of one old trammel point, a piece of drill rod, a yoke



for the cutting tip to go through, two thumb screws and a bracket for the torch handle.

With this type cutting jig we can cut our flanges to a tolerance of 1/16 of an inch. Fig. 6 shows flange on end of pipe, for assembling pipe into shop lengths. See jig, Fig. 4, Fig. 5, Sec. AA-BB. This jig is made with two pieces of 16-gauge iron, rolled ¼-inch

(*Continued on page* 99)

Expansion Joints Are Necessary In Every Long Stretch of Metal

WHENEVER sheet metal is exposed to the elements it expands and contracts. Expansion occurs in hot weather; contraction takes place in cold weather. And during all the changes of temperature in between the maximum and the minimum this sheet metal is in motion hour by hour.

The amount of expansion and contraction depends upon two things—the kind of material and the range in temperature change. All metals obey this physical law—some metals more than others. Technically this change in size is known as the coefficient of linear expansion and each metal has its particular coefficient. The coefficients for some common materials are—

Aluminum	.0000124
Copper	.0000096
Iron	.0000065
Lead	.0000151
Molybdenum	.000002
Tin	.000011
Zinc	.000018

The above coefficients mean that, for example, copper expands .0000096 of an inch for every degree of temperature rise or decrease.

The practical application of these facts comes when we fabricate and install a length of metal work such as a cornice or gutter and must make allowance for the movement of the metal. If we do not make allowance for expansion and contraction the stress set up will tear the metal work apart.

Let us suppose that we have a box gutter 60 feet long and that we want to calculate the expansion and contraction which must be provided for. We understand of course that the dividing point is the temperature during the time the work is being installed. Let us suppose that the temperature during the time of installation is 70 degrees and that the community ordinarily has minimum temperatures of 10 degrees below zero and maximum temperatures of 105 degrees F. To the maximum temperature we will have to add about 50 degrees because the metal exposed to the sun actually reaches 150 to 180 degrees of temperature. We have then—

Coefficient of expansion of copper—.0000096.

Minimum temperature—
—10 degrees.

Maximum temperature—
150 degrees.

Contraction temperature difference—70— (—10) is 80 degrees.

Expansion temperature difference—150 — 70 is 80 degrees.

Amount of contraction is 60 (ft.) × .0000096 × 80 equals .044 ft. or .62 inches or ⅝ of an inch.

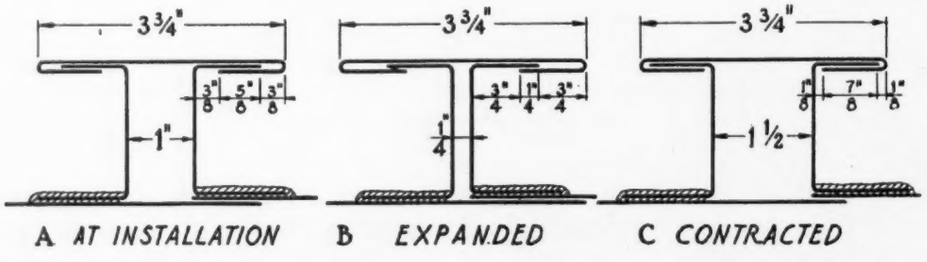
Amount of expansion is 60 (ft.) × .0000096 × 80 equals ⅝ of an inch.

We find thus that from the position as we lay the metal in the gutter the gutter will be ⅝ of an inch shorter in our coldest weather and ⅝ of an inch longer in our hottest weather—a total movement of 1¼ inches.

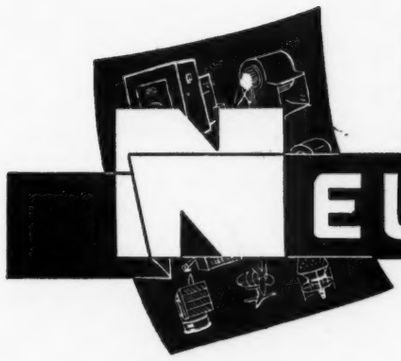
How can we take care of this relatively large movement in our 60 foot gutter. We do this with a suitable expansion joint. While several types of expansion joints have been developed through the years, the industry generally has accepted the type of joint shown in the illustration for most gutter purposes. The joint with slight modifications is also used on flat copper surfaces where the metal must be soldered together.

When used in a gutter the ends of the gutter lining sheets are turned up at right angles to and slightly higher than the depth of the gutter and the ends are then bent outward at 90 degrees as shown. A cap is formed to slip over the turned out ends, but is folded loosely so that the ends of the lining sheet may move within the cap. The joint should allow at least ¼ of an inch between the vertical faces of the lining when the gutter is fully expanded and the cap should be wide enough and the lining flanges wide enough to permit free movement when the guttter is fully contracted. The top of the joint should be higher than the outside edge of the gutter so that if water backs up to fill the gutter it still cannot get under the cap and thence under the lining.

Expansion joints of this and all other types should be placed at the high points of the gutter. It is advisable to place a joint at least every 50 feet and where it is possible to install several downspouts, place the joint at closer intervals. Joints need not be at the exact center points—the chief purpose is to break up any "too long" lengths of solid metal.



Recommended construction of an expansion joint suitable for a long boxed gutter or a long stretch of flat metal surface where all sheets are soldered for water tightness. Drawings from Sheet Copper, handbook of Copper and Brass Research Association, New York.



For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 114 and mail to us. Complete information will be forwarded.

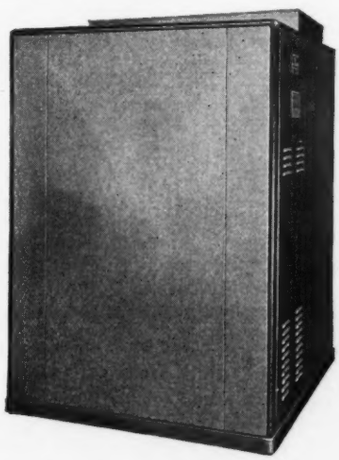
● Indicates product not listed in 1936 Directory

△ Indicates product and manufacturer not listed in 1936 Directory

NEW PRODUCTS

86—AFCO Air Stream Unit

American Furnace Company, St. Louis, Missouri, announces a new "AFCO," oil burning unit housed in a specially designed air-stream cabinet, finished in a crackle green. Features include a heavy boiler-plate combustion unit and secondary heating surface; double wall, insulated cabinet and specially baffled to control air travel;



full floating, centrifugal type blower with resilient mounted, spring tension motor; counter current air flow over a secondary heating surface and natural air flow over primary heating surface; newest and approved type of atomizing oil burner; can be equipped with any of the latest types of humidifiers; large filter area; controlled from tumbler switches on the side of unit—all parts readily accessible; fully automatic operation; made in four sizes—141,000 to 564,000 B. T. U. input.

◆

87—International Fabricated Duct

The International Heater Company, 101 Park Avenue, Utica, New York, announces fabricated duct, cost guaranteed to the dealer under a new plan, making the only variable in the dealer's cost structure to be labor of erection. This, they say, permits the heating contractor to quote a price on the complete job during his first interview with the owner or architect.

International says that in using their method it is not necessary to know the heat loss of each room or even necessary to make a sketch of the house before quoting and closing the deal.

88—Autocrat Air-Conditioning Warm Air Furnace

Autocrat Oil Burner Corporation, 100 E Avenue, N. W., Cedar Rapids, Iowa, is announcing the new Autocrat Air-Conditioning Warm Air Furnace.

The specifications are: Fired by Autocrat's Master Model E-1 oil burner (flange mounted) which bolts direct to front of steel combustion chamber.

The cold air is drawn past a series of secondary flues, filtered and then blown around steel combustion chamber and series of primary flues. About one-third of the heat rise takes place before the air is drawn into the blower fan.

Heat provers show an efficiency of around 86.5 per cent with stack temperature in the neighborhood of 310 deg. F. Stack temperatures of around 250 deg. F. are possible, but 310 deg. F. represents average operating conditions. Flues are designed to provide maximum wiping action from blown air.

This unit is exceptionally quiet in operation and produces warm air in less than one minute from a cold start. Blower, furnace and oil burner are housed in an attractive metal jacket.

The unit is made in four sizes ranging from 120,000 B.t.u. per hour at the bonnet to 225,000.

The blower is designed to provide a complete change of air every fifteen minutes in the winter and about every eight minutes during the summer.

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89—New Humidifier

Maid-O'-Mist, Inc., 180 N. Wacker Dr., Chicago, Illinois, announces a new popular priced humidifier for warm air furnaces. The new unit consists of a gutter shaped pan stamped in one piece from sheet copper bronze. The metal is not much thicker than paper,

therefore transmits the heat almost instantly to the water. Copper bronze metal has a heat transmission at 212 degrees of 1.943.

The pan is 3½ inches in diameter and 36 inches long, having a heating area in excess of 350 square inches and an evaporating area of 126-square inches. It is equipped with an adjustable hood to fit the shape of any furnace bonnet, and the pan may be easily removed for cleaning.

The humidifier is supplied with water through a midget ball-cock known as the No. 55 Water Boy. The valve is operated by a copper float which has an adjustable lever to regulate the height of water carried in the humidifier. The valve is only 7 inches long over all and only requires 1 inch of water in the pan to operate it.

The valve stem and seat is made of nickel silver and the body of the valve houses a monel metal removable filter. All bearings are made of monel metal.

The unit is supplied with copper tubing and a saddle valve to connect on to the water piping. All that is necessary is to drill a small hole into the water line and attach the saddle valve.

Circular 555 describes the unit.

New Products . . . . . .

90—Cooling Unit

The Willard Metallic Crypt Co., Willard, Ohio, is now producing the Willard Air Cooling and Conditioning Unit for the small restaurant, tearoom, office, beauty parlor, or lodge room.

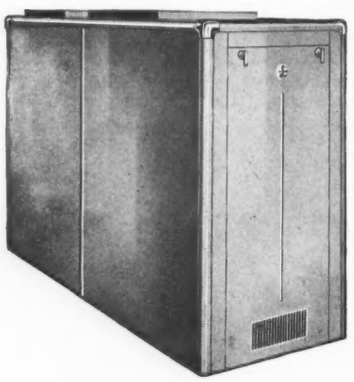
The Willard employs ice for cooling. Hot, dusty, odor-laden air is drawn in, passed through an ice spray mist, thereby removing all dust, odors, and gases soluble in water, and cooling the air. Air is then dehumidified and returned to the room. No mechanical filters are employed. There is a portable unit mounted on casters and a small built-in unit, both powered by an electric motor. The No. 10 unit designed primarily for business places is usually installed in the basement with a duct system to distribute the cool and conditioned air.

◆

91—Air Conditioner

Lewis Air Conditioners, Inc., 1600 Northeast Broadway, Mineapolis, Minnesota, announce a new mechanical warm air conditioner, manufactured in four sizes, designed primarily for installation with any standard type of oil burner, or with gas as fuel.

The conditioner consists of a complete plant in which all parts are correlated into a single compact unit. The unit humidifies and circulates the air while operating as a heating unit in winter, and filters and circulates the air in summer. Air passing through



the unit is preheated over a series of flues, then drawn through a series of filters which remove the dust. After the air is filtered, it is humidified, and then forced with a definite wiping action over the entire area of the combustion chamber. Next it passes upward through another series of special designed and spaced flues into the ducts for distribution to each room.

In summer, a door panel in the back of the blower compartment can be removed to admit cool basement air to be circulated throughout the house. Provision is made for installation of an accessory cooling system by which the air can be cooled and dehumidified to a comfortable degree during the hottest days, using either cold water or mechanical refrigeration as the cooling medium.

The unit occupies 23 square feet of floor space, is rectangular in shape and requires a minimum of head room. It is housed in a steel finished cabinet with aluminum trim.

A four-page folder has been prepared for distributors.

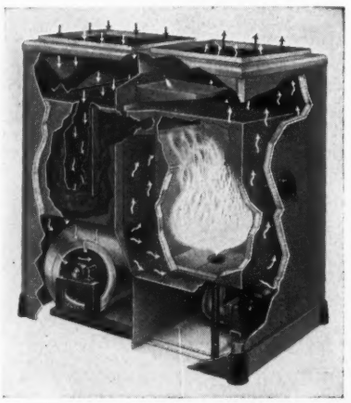
◆

92—New Air Conditioner

Scott-Newcomb, Inc., 1922 Pine St., St. Louis, Mo., announces the new S-N air conditioner in three sizes—100,000, 200,000 and 400,000 B.t.u. output.

The case is finished in three colors, black base, with two tones of green. Octagon corners are used, and the top carries a bevel edge and projects slightly over the edges of the case and octagon corners.

Contra-flow principle of heat flow is



used. The products of combustion pass upward in the combustion chamber, which is lined with firebrick, and then downward through a part of the economizer section and upward to the top of the economizer section, and out to the flue. The cool return air coming from the rooms, comes through the air filters and down over the economizer section. The cool air contacts first with the cooler part of the economizer section and is heated progressively and is sucked into the blowers, which are located below the economizer. The air from the blowers is delivered over the much hotter exterior of the combustion chamber and through ducts to the rooms. This method gives the utmost efficiency with the smallest amount of surface.

The interior of the casing is lined with air cell insulation, and in the compartment around the combustion chamber, there is an additional sheet metal reflecting surface having an air space between this surface and the air cell insulation. All parts are easily accessible. Two large panels are quickly removed from either side, giving access to the burner, which is located in a separate compartment below the combustion chamber and below the main air stream, and the blowers are also accessible from either side by removing the lower side panels.

The humidifier is furnished in two types—the pan type with automatic float feed, or with a self-cleaning spray nozzle.

The S-N Gas Burner is furnished where gas fuel is wanted.

◆

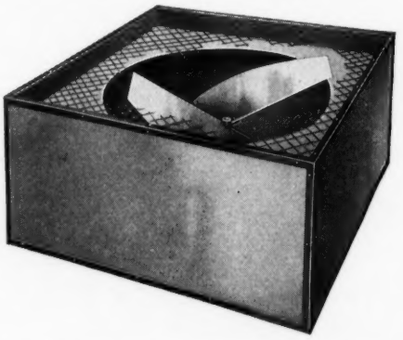
93—Air Conditioner

Robeson Engineering Company, 290 Sanford Street, East Orange, New Jersey, announce the new and improved Robeson air conditioning furnace. The unit is furnished in sizes ranging from 110,000 to 300,000 B.t.u. delivery at the register and a maximum C.F.M. delivery of 1600 to 4500 at the register. Motor sizes range from ¼ to ¾ h.p.; filters from two cells to six cells. Spacing sizes range from 45 x 35 to 84 by 51 inches. All casings are rectangular, finished in red and black, with the furnace blower, oil burners and filters housed within a single casing. The unit is supplied with a gun-type burner firing into a refractory line, steel combustion chamber of rectangular shape. A rectangular, baffled radiator is used at the back of the furnace. The blower is a pull through type, bringing heated air from the furnace into the blower and exhausting into the bonnet.

◆

94—Night Cooling Fan

Giant Nite Fans are now offered in three sizes—10,000, 6,600 and 4,500 c. f. m.—by the Russell Electric Company, 340 West Huron Street, Chicago. These units are designed for



installation on the attic floor above a drilled opening in the ceiling below, thereby drawing air through household windows and exhausting it through attic ventilating openings.

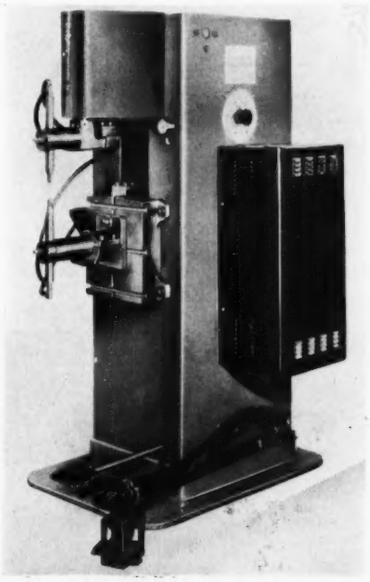
Motor employed is vertically operating Ballentine capacitor with multi-speed control, direct connected to patented Planoidal fan and supported by large flexible rubber cushions carried by a substantial welded I-beam structure in the base of the cabinet. A coating of sound deadening material is employed.

New Products . . . . . .

95—Press Type Welder

The Eisler Engineering Co., 750 So. 13th St., Newark, N. J., announces its large press type electric resistance welding machines.

Press type welders are available up



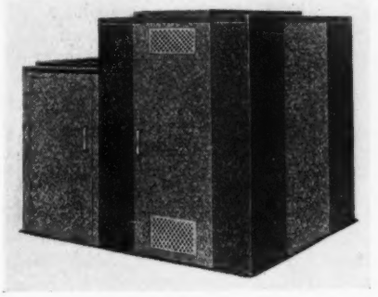
to 250 K. V. A. and can be supplied in foot, motor or air operated models. These machines are intended for handling various thicknesses of metal and are made in throat depths from 16 up to 48 inches. They may be had with speed changes ranging from 30 to 100 welds per minute.

The welder is a self contained unit. That is the timer, contactor and switch are all assembled in the welder.

◆

96—Air Conditioner

The Fox Furnace Company, Elyria, Ohio, announces a new Sunbeam air conditioning unit for residences and buildings with heating requirements of less than 100,000 B.t.u. The new unit heats, filters, humidifies and circulates



the air in winter and provides for increased circulation in summer. It is equipped with a rotary, wall-flame type oil burner completely assembled at the factory with the motors, oil valves, ignition transformer, electric pilots and hearth with dual electric system, ready to be placed in the heating element.

There are two models: The 720-R-10 for basement installations and the 720-R-9 for installation above the basement. The 720-R-9 is especially compact. Blower compartment is under the smoke pipe to save space. Return air ducts can run under the floor and feed upward into the blower compartment. The 720-R-10 has the blower compartment on the side. Blowers for both models are of the double wheel, double inlet type with a rubber-cushioned, capacitor type motor.

◆

97—New Model Lochinvar Furnace

Lochinvar Oil Burning Products Corporation, 11921 Grand River Avenue, Detroit, Michigan, announces a new model 100-A furnace with Lochinvar oil burner to provide filtered, humidified air with exact, automatic temperature regulation. The burner uses No. 1 fuel oil, and is said to be "whisper" silent.

Specifications include 10 ga. combustion chamber head, 12 ga. combustion shell—boiler steel, 12 ga. radiator

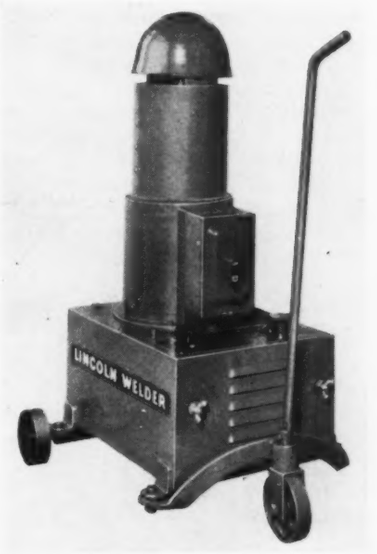
—boiler steel, seams all welded gas tight, 8 in. stack connection, 16 in. Lochinvar multiple-stage burner, 3 ga. combustion chamber baffle-locomotive steel, overall height of combustion chamber and burner is 49 in., combustion chamber diameter is 20 in., radiator dimensions 20 in. wide by 27 in. long by 22 in. deep, 24 ga. SAE 10-10 steel side front and rear, panels, 20 ga. SAE 10-10 steel top and corner posts, overall casing dimensions 36 in. wide by 57 in. high by 54½ in. deep, 110,000 B.t.u. output at register, 123,000 B.t.u. output at bonnet, finished in two shades of ripple green enamel.

The blower has 1,200 c.f.m. capacity, spun glass throw-away type filters, Minneapolis-Honeywell bonnet switch and all copper and brass automatic humidifier.

98—New Welding Machine

The Lincoln Electric Company, Cleveland, Ohio, has recently developed a new welding machine—motor driven, single operator type arc welder for general fabrication and repair work.

This "SA-150" machine is intended



for a variety of applications, including sheet metal work, hardfacing, pipe welding, fitup and auxiliary work in shops where regular production welding involves steel, alloy and non-ferrous plates and shapes. It can be used with either bare or shielded arc type electrodes.

The welder has dual control of voltage and current, allowing independent adjustment of arc heat and arc penetration to suit the welding application. It is powered by a "Linc-Weld" 7½ h. p. A. C. motor.

◆

99—Mercoid Stokatherm

The Mercoid Corporation, 4209 Belmont Ave., Chicago, Illinois, announces the Stokatherm for complete stoker regulation.

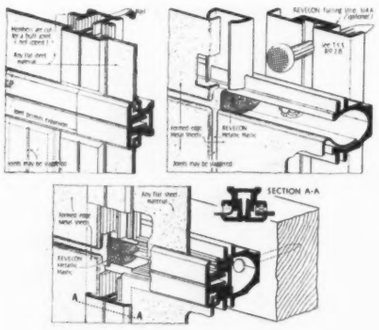
The firing periods of the unit are directly responsive to the combustion condition and are automatically regulated to meet the variable conditions encountered on each installation. The Stokatherm operates the stoker for only the shortest periods necessary to maintain a minimum fire while the thermostat is in the "off" position (30 seconds to 12 minutes). The out-fire feature guards against filling combustion chamber with unburned fuel after fire has gone out, or operating an empty stoker.

The unit combines a transformer-relay and a self starting, synchronous timer. A mechanical interlock keeps the timer from operating the stoker immediately after the thermostat shuts off. Bulletin No. 243-C describes these controls.

New Products . . . . . .

●100—Revecon System

Revere Copper and Brass Incorporated, 230 Park Avenue, New York City, is introducing the Revecon System for holding sheet materials. The fundamental advantage of the Revecon System claimed is the facility with which a transition joint is formed between connecting areas of Capped-joint and Pointed-joint construction in the same installation and in one plane. Joints may be horizontal or vertical.



The company provides basic architectural data through the medium of a series of data sheets. The system is designed for both interior and exterior construction.

The flat sheet materials are held along all four edges by the gripping joint developed by driving the cap members into the gripping members. Adjustable take-up is provided. The joint, they say, has withstood a direct pulling force of 800 pounds per lineal foot before the sections were parted. The gripping joint is waterproofed by Revecon Metallic Mastic.

Any type of flat rigid sheet material in any thickness up to ½ in. may be accommodated with the Revecon Cap and Gripping Sections.

Flashing at parapets, cornices, etc., is accommodated in Revecon members in the space into which the panel is ordinarily inserted in both Capped and Pointed-joint construction.

Revecon sections are designed to accommodate various thicknesses of flat rigid sheet materials of different manufacture (including glass), long span sections, assembly of various angles, terminations, and framing for door and window openings.

◆

101—Light Gauge Welding Rods

Hobart Brothers Company, Troy, Ohio, offers "Thinweld," a specially coated electrode for arc welding light gauge sheet metal, in 1/16, 3/32 and 1/8-in. sizes. Used with low ampere arc welders the combination makes practicable arc welded metal as light as 24 and even 26-gauge.

102—New Furblo Package Unit

Furblo Company, Hermansville, Michigan is announcing a popular priced package unit, complete, ready to attach to the furnace (including furnacestat). Specifications include a centrifugal blower which they claim has ample capacity for the average home up to six rooms, Furblo universal self aligning bearings, machined cast iron pulleys; two 20x20 in. cleanable and air sealed filters; quiet, steady and dependable motors guaranteed not to interfere with radio reception.

For summer ventilation, the access door can be entirely removed for circulating basement air, all of which will pass through the filters.

The unit is finished in opalescent olive green and is of a size for window display. The casing is 22x26x30 in.

◆

103—New Gar Wood Unit

Gar Wood Industries, Inc., Detroit, Michigan, announces the Gar Wood gas-fired tempered-aire unit, entirely automatic in operation. In addition to supplying abundant, forced, warm air heat at low operating cost, the gas-fired unit provides air ventilation and circulation, air humidification and filtration, and summer blower cooling.

The concave and convex surfaces absorb the intense gas heat through the "scrubbing" principle. The company states these units are approved by the American Gas Association. The burners (one per section, making a total of four) are engineered integral with the furnace. Full automatic controls, including pressure regulating valve, safety pilots, Minneapolis-Honeywell gas valve, thermostat and combination furnace control. (Controls 60 cycle-A. C. standard.)

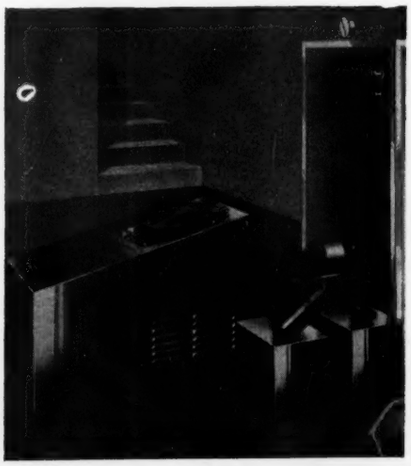
Furnace is non-corrosive copper-bearing steel, welded, in four sections. Designed for long-life and high-operating efficiency. Casing of auto body stock with bright, lacquer finish. Evaporator pan humidifier with float valve control. Air equipment includes ample size blower with quiet rubber-mounted bearings, pulleys, belt, motor, etc., completely enclosed in cabinet (finished to match furnace) automatically controlled in conjunction with burner. Removable, washable, dry air filters. Blower motors standard for 110 volt or 200 volt 60 cycle A. C. Current consumption 250 watts.

Model 120, A. G. A. input, 180,000 B.t.u. per hour; A. G. A. output, 135,000 B.t.u. per hour; net room delivery, 120,000 B.t.u. per hour; c.f.m. air delivery, 1200 to 1900; air temperature at bonnet, 175 to 135; blower size, 14 x 14 in.; blower motor, ¼ H.P.S.P.; filter area square feet, 34 ft.; gas connection, 1¼ in.; flue size, 10 in. x 4 in.

◆

104—Anchor Kolstoker

The Anchor Stove and Range Company, New Albany, Indiana, has just announced a new anthracite model of the Anchor Kolstoker. It is furnished in either the standard type or with automatic ash removal.



Special features of the Anchor Kolstoker incorporated in the anthracite model are the oilmotor drive, which assures silent but powerful operation; the attractive cabinet, which is lined with special sound-proof insulation, making truly silent the operation of the drive unit; the feed worm inspection plate which makes it easy to remove obstacles from the coal feed mechanism; the sectional burner head which permits expansion and contraction without cracking or warping; the low hopper which is easy to fill and provides big coal capacity; and the safety of the cabinet design which completely encloses all working parts.

◆

●105—New Calculator

The Trane Company, LaCrosse, Wisconsin, has developed a Psychrometric Pad and a simplified, calibrated Ruler for use with this Pad, which they say allows all air conditioning problems to be calculated with lightning-like speed and precision.

Complete instructions for using the pad and ruler are part of the regular full-size 50-sheet Pad, offered at small cost.

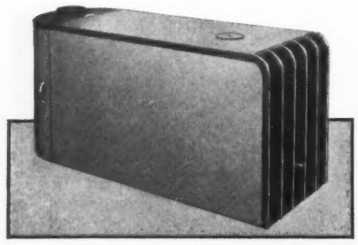
AMERICAN ARTISAN'S

5th Annual Directory Number is now being prepared and will be ready for distribution in January. The 1937 edition will contain complete, up-to-date listings of all products used in warm air heating, residential air conditioning and sheet metal contracting work, with names of their manufacturers, trade names and full addresses. It will be bound in a special, heavy cover to withstand the wear and tear of reference to it throughout the year. Dealers, contractors and wholesalers will find it answers every question of "who makes it" and "where are they located". That is why leading manufacturers already have this January Directory Number on their advertising schedules for full presentations of their lines. No increase in rates over regular issue. Reservations are now being accepted.

New Products . . . . . .

106—Hot Water Generators

The Nu Way Corporation, Rock Island, Illinois, announces a new series of hot water generators in two sizes—43 and 90-gal. capacity. Both are of



the horizontal return-tubular type, and both are equipped with specially designed high pressure burners.

Unusually large heating surfaces permit the use of high pressure burners operating at from one gallon of No. 3 oil per hour to 1.35 gallons per hour.

◆

107—Perfex Offers Automatic Controls

Perfex Controls Company, Milwaukee, Wisconsin, is a new source of supply for automatic controls and control systems for the heating, air conditioning and refrigeration industries.

Perfex controls are said to embody the latest engineering principles as related to controls, and to have many exclusive Perfex features which set entirely new standards in the industry.

These controls and control systems are offered through the following offices under the direction of the men listed: Shepard Barnes, Vice President in charge of Eastern Territory, 202 E. 44th Street, New York; C. Ellis Hayes, Manager Philadelphia Division, 3701 N. Broad Street, Philadelphia; Charles B. Soper, Manager New England Division, 131 Clarendon Street, Boston; Allen Butler, Manager Mid-Western Division, 500 N. Dearborn Street, Chicago; W. W. Boes, Mutual Home Building, Dayton; E. Harold Clark, 600 Michigan Theatre Building, Detroit; P. J. O'Meara Co., 50 Hawthorne Street, San Francisco; O. E. Lewis Company, 732 Camp Street, New Orleans.

W. R. Miller, formerly with the Chicago office of Minneapolis-Honeywell is in charge of the Perfex field research engineering department.

Additional offices in other cities are being opened as quickly as capable representatives can be found.

◆

108—Stainless Steel Vapor Pan

Automatic Humidifier Co., Cedar Rapids, Iowa, is announcing a new stainless steel vapor pan, which they say is particularly adapted to the conditioned air system, and weighs only seven pounds.

The water level is controlled by simple expansion and contraction of the aluminum tube which is in the jacket of the furnace. When there is no heat, there is no water in the pan. When the heat starts, the drip commences and as the heat increases the drip increases in proportion to the heat. The smooth temperature control of the automatic drip humidifier is possible because of the increasing and decreasing of the temperature of the heating system.

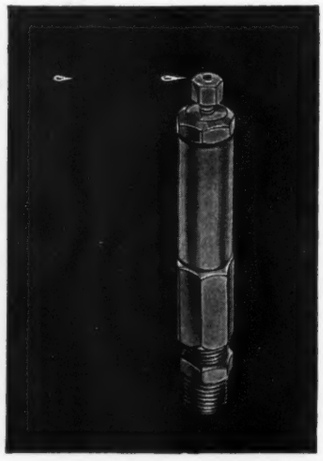
The pans are made in five sizes.

◆

109—Self-Cleaning Drip Nozzle

Rega Manufacturing Company, 79 Mount Hope Avenue, Rochester, New York, is just bringing on to the market the Rega self-cleaning drip nozzle.

This nozzle, made of brass, produces a very fine spray, and is said to operate on a line pressure of from 20 to



120 pounds without the use of air. It is furnished in capacities of 6. 7 and 9 quarts of water an hour at 40 pounds pressure. The volume increases slightly at higher pressures. It is 1¼ in. in diameter and 2⅜ in. long.

Each time the liquid is shut off, the orifice in the nozzle through which the liquid passes is cleaned. When the liquid is turned on, that part of the nozzle in which the orifice is placed is moved away from the cleaning pin and remains in this advanced position during the time the liquid is turned on. When the liquid is shut off, the part is returned to its original position and the cleaning pin is forced through the orifice. The cleaning pin is made of monel metal. A 100-mesh screen is placed in the base of the nozzle for filtering purposes and nozzles are furnished with ⅛ in. male pipe thread connections.

110—Metal-Bord

American Nickeloid Company, Peru, Illinois, has developed Metal-Bord, a product which replaces metal volume and weight by a non-metallic substance. This is accomplished by adhering thin sheets of pre-finished metal to cardboard or other backing material. The metallic appearance of the sheet is retained, but the body of the sheet is largely the non-metallic backing. The adhering cement, they say, will remain plastic and flexible and has practically permanent adherence.

The advantages claimed are lower cost and saving in weight. Any thickness of metal can be used and composited to practically any type and thickness of backing. Metal-Bord permits a lighter gauge of metal, yet makes possible a rigid, strong finished product. It adapts itself to blanking and shearing and other production machinery.

Metal-Bord is available in any of the pre-finished metal sheets offered by American Nickeloid—bright, satin, striped, crimped, corrugated. It can be used for ornaments, signs, advertising specialties, display stands, or decorative panels.

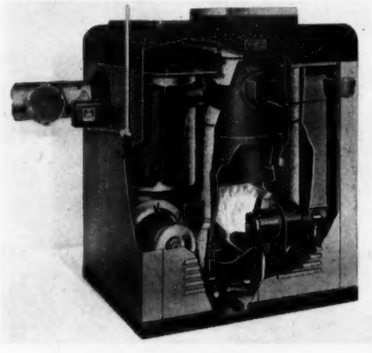
◆

111—Timken Oil Furnace

Timken Silent Automatic Division of The Timken-Detroit Axle Company, Detroit, Michigan, announces a new type of winter air-conditioning oil furnace.

The outstanding feature is a chromium steel fire-box used in connection with the Timken Model GC pressure oil burner. This metal fire-box replaces the usual brick or cast refractory and permits the bottom and all of the sides of the combustion drum to be used as effective heating surface.

The cabinet is of heavy gauge steel, finished in baked green lacquer. The



design provides ventilation between the cabinet and inner casing.

Controlled moisture supply is made possible through the use of a humidifier equipped with an automatic water supply mechanism.

The unit has a capacity of 80,000 Btu's at the registers and can deliver from 800 to 1200 cu. ft. of air per minute. Overall measurements are 41⅝ in. wide, 50⅞ in. long and 59 in. high.

QUALITY.... SERVICE

ON EVERY COPPER INSTALLATION

● HUSSEY

That's exactly what you get every time you specify and install HUSSEY Copper. HUSSEY has for years been a leader in the sheet copper field. Contractors find that the extreme ductility, long wear and permanence of HUSSEY Copper save time on jobs and help build them a profitable trade. They know that once installed they can depend on it to give years of trouble-free service.

Prompt service has also played an important part in establishing the HUSSEY name among the users of sheet copper. Every order receives prompt attention at any of our thirteen sales offices and immediate shipment from seven centrally located warehouses.

Acquaint yourself with the HUSSEY organization. One order will convince you that it is "tops" in the sheet copper field. Send now for literature.

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SAN FRANCICSO

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The New WISE Master Model Series "A"

will

KEEP 'EM WARM!

WISE PEOPLE BUY WISE FURNACES
LESS FUEL - MORE HEAT

It won't be a cold winter for the homeowners who buy the new WISE Master Model Series "A," and it will be a profitable Fall for the dealers who sell this new furnace.

It is designed for gravity or forced air jobs, performing with satisfaction and economy on either.

Dealers who have handled and are now handling WISE have found that such unmatched features as those contained in the new Master Model Series "A" help more than anything else to clinch sales on those tough customers. Just check and see for yourself . . . one-piece, self-cleaning radiator . . . new ash-pit and lower front . . . one-piece cellular firepot (proved by University tests to be at least 9% more efficient) . . . assurance of a hot water supply (This feature available at slight extra cost).

You can't afford to let Opportunity's knock go unheeded, write for our new catalog today.

WISE FURNACE COMPANY • AKRON, OHIO

Philadelphia

The 25th annual meeting of The National Association of Sheet Metal Distributors will be held at Atlantic City, New Jersey, on Tuesday, October 20, at the Marlborough-Blenheim Hotel, during the annual convention of The National Wholesale Hardware Association and the American Hardware Manufacturers' Association.

This meeting will bring together prominent sheet metal distributors and representatives of the mills.

At a recent meeting of the executive committee, the following committees were appointed:

Galvanized and Black Sheets & Corrugated Roofing Committee:

F. J. McNeive, Chairman, W. F. Potts, Son & Co., Inc., Philadelphia.

Bruce Haines, E. E. Souther Iron Co., St. Louis.

I. W. Dobbins, Belknap Hardware & Mfg. Co., Louisville.

H. B. Thompson, Conklin Tin Plate & Metal Co., Atlanta.

Tin and Terne Plate Committee:

O. F. Murphy, Chairman, Lyon, Conklin & Co., Baltimore.

Z. T. Hall, Hall & Carpenter, Philadelphia.

Warren Miles, Wheeling Corrugating Co., Philadelphia.

Eaves Trough and Conductor Pipe Committee:

E. H. Hoffeld, Chairman, The Ferdinand Dieckmann Co., Cincinnati.

W. H. Terstegge, Stratton & Terstegge Co., Louisville.

H. E. Usinger, Berger Bros. Co., Philadelphia.

J. M. Burbank, Farwell, Ozmun, Kirk & Co., St. Paul.

Dr. C. P. Rice, York Corrugating Co., York, Pa.

Prepared Roofing Committee:

Joseph Stelwagon, Chairman, Stelwagon Manufacturing Co., Philadelphia.

C. A. Nenno, J. M. & L. A. Osborn Co., Buffalo.

A. H. Nichols, Buhl Sons Co., Detroit.

Eugene Foley, Bayonne Steel Products Co., Newark.

These committees will make an investigation of the conditions surrounding the distribution of the various lines and make a complete report with recommendations as to the manner in which the distribution of these lines may be placed upon a more satisfactory basis.

It was the decision of the executive committee that the entire time will be devoted to distribution and management problems in which all members are interested.

Members will also be advised as to the manner in which the Robinson-Patman Act, the Social Security Act, and the enactment of the Walsh-Healey Bill will affect their businesses.

George A. Fernley,
Secretary-Treasurer.

Services Offered

SHEET METAL

AIR CONDITIONING & HEATING CONTRACTORS OF ST. LOUIS

WILL APPRECIATE SERVING YOU FOR GUTTERING, SPOUTING AND FURNACE REPAIR.

Advance Sheet Metal Wks.	FO. 8195
Auer Sheet Metal Co.	CO. 7662
Jos. Bias	FR. 8396
Baumgartner & Otten, Inc.	CE. 0224
Frank T. Bokern	MA. 1061
W. S. Cavallo	RI. 5225
A. Cuneo	FO. 6376
E. D. Cuddy	RO. 9073
Droste & Rockel Co.	EV. 2391
Louis B. Friebel	LA. 1085
Fleck Sheet Metal Wks.	PR. 1303
Gerock Bros. Mfg. Co.	NE. 1209
Gevecker S. M. Wks.	FO. 8017
C. L. Graeser, Tinner	WEs. 367
Thos. F. Grimmer	FO. 7878
Grossenbacher Furnace Co.	WA. 406
Gruendler Hdwe. Co.	CE. 1444
J. W. Grunderf	GA. 7217
F. Harsch	LA. 1579
A. F. Heinichen	RI. 05003
L. H. Hirschhausen & Son	FR. 2970
Alex H. Hoell	GR. 8692
Ben Kolbenschlag	CO. 4141
Lobl & Greenlaw	GR. 1215
Meier Bros.	HI. 0900
Thos. McHenry & Son	NE. 1850
National Roofing Co.	CA. 6588
Robertson Cornice Co.	FO. 0995
Jos. Schmidt	CE. 3592
Mike J. Tasch	CE. 6464
Luke Tiernan	FO. 1234
Fred Will	CO. 1652

Fort Wayne

At a recent special meeting of the Sheet Metal, Roofing and Warm Air Heating Contractors Association of Ft. Wayne, Indiana, called for the purpose of discussing matters of importance to the membership, the following resolution was read by the secretary and adopted.

Whereas, The all wise being, by his wisdom has decreed that O. (Pop.) Voorhees be removed from our midst, and,

Whereas, His presence, his smile, his wise counsel, and his untiring efforts to render and spread valued assistance, in a moral and educational manner throughout the industry in the state of Indiana are at an end, and,

Whereas, The principles and policies practiced by this wonderful personality, were of such magnitude as to force those fortunate enough to have known him, to love, to admire and to respect him to a degree far beyond the average, and,

Whereas, This loss has cast sorrow upon the membership of the industry in Indiana, as well as those of his family, those who were privileged to contact him in a business way and those who were associated with him in business.

Be It Resolved, That the Sheet Metal, Roofing and Warm Air Heating Contractors Association of Ft. Wayne, Indiana, in special session assembled on this the 11th day of August, 1936, in recognition of this tremendous loss, and in memory and respect for his ability and service rendered, stand in silence with bowed heads, one full minute, and, be it further

Resolved: That a copy of this resolution be spread upon the minutes of our next regular meeting, a copy be mailed to the bereaved family, and a copy be mailed to the trade papers for publication, and that the membership of the industry adopt the principles and policies laid down by him, and thereby profit by his having gone about amongst us.

Chas. E. Tharp, Secy.

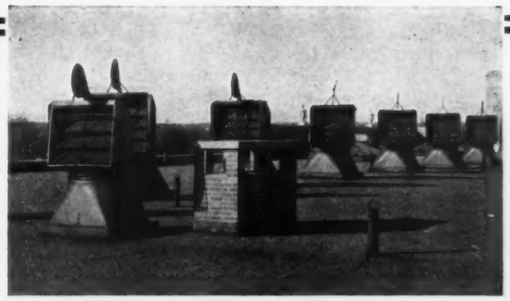
New York

The Roofing Crafts Institute met at the Hotel Astor on August 12, with representatives of all boroughs.

The Roofing Crafts Institute is the beginning of what is hoped to be a strong metropolitan organization, covering New York, Brooklyn, Long

You take no chances when you recommend and install *Quality*

Swartwout
ROTARY BRONZE BALL BEARING
Ventilators



Their conservative rating assures capacity to spare.

They have strength, durability, and long life beyond any other.

There is nothing to get out of order.

Made of the finest materials:

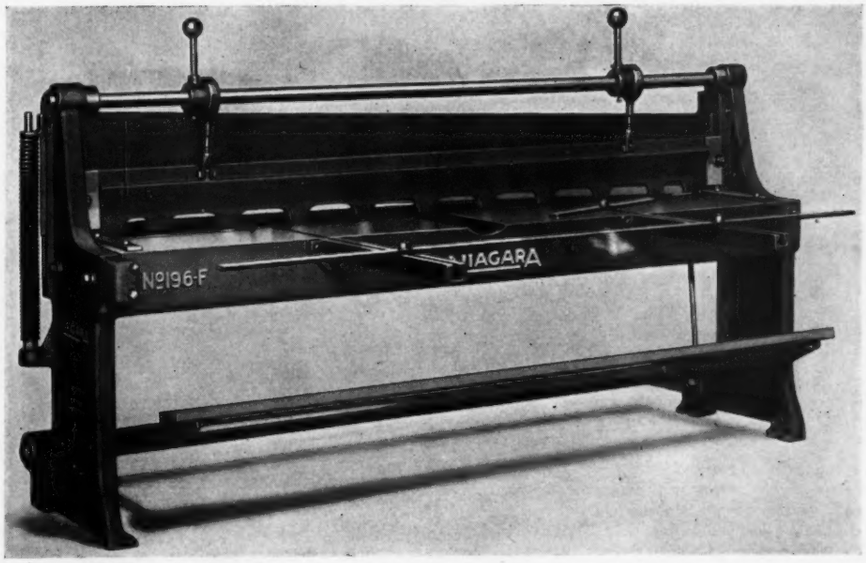
Bronze ball bearings and races, Armco galvanized sheet metal, and heavy steel interior members with rust-resisting finish applied after forming and punching.

They net you a generous profit and assure customer good-will and future business.

What more could you wish in the ventilators you install—why be handicapped with less? Write for catalog today.

THE SWARTWOUT COMPANY
18615 Euclid Ave., Cleveland, Ohio

You Get Easy Operation, Accurate Shearing with



NIAGARA
FOOT OPERATED
SHEARS

This No. 196-F, Niagara shear is built for No. 18 gage capacity with 8 foot cutting lengths. Easy operation and accurate shearing make this shear ideal for the shop or out on the job where power is not available. Included in its features are clear visibility of cutting line, parallel screw adjustable back gage with steel graduated scale, front, side and bevel gages, Niagara steel laid knives with alloy steel cutting edge, T slots in bed graduated for setting gages, bed recessed in center for convenience in handling sheets. Write for Bulletins on the complete line of Niagara foot and power shears, with and without gap.

Money Makers for Your Sheet Metal Shop

Folders—Brakes
Groovers—Seamers
Slip Roll Formers
Power Presses
Shears; Squaring, Rotary
Lever Shears—Punches
Machines for Turning, Wiring, Beading, Burring, Flanging

NIAGARA MACHINE & TOOL WORKS, BUFFALO, N. Y.

NIAGARA

Island, Bronx and Staten Island. Irving Payson Zinbarg, counselor-at-law, has been retained by the Queens Roofing, Sheet Metal and Re-Siding Contractors Association as an organizer. One of the objects of the association is to obtain the co-operation of the jobber and the manufacturer to protect dealers. The organization has established a credit information, collection and mechanic's lien bureau, and the plan is to establish such other additional bureaus as will promote the welfare of the membership.

Among the persons who spoke at the August 12 meeting urging roofing, sheet metal, shingling, re-siding, ventilation and sky-lighting contractors in the metropolitan area to join with Roofing Crafts Institute were:

Karl H. Gohlke, roofer, of Brooklyn; Samuel Weingart of the Roosevelt Roofing and Sheet Metal Works of Queens; Joseph H. Scaife of the Ace Construction Company of Richmond Hill; Richard H. Freyberg of New York; George Brown of Craig and Brown, Inc., of Brooklyn, and H. F. Natemeyer of Stoker-Roberts Corporation of Queens.

It was decided by a vote of the membership that in view of the fact that Roofing Crafts Institute was the expansion of the Queens Roofing, Sheet Metal and Re-Siding Contractors Association into the metropolitan area, that Roofing Crafts Institute hold an election at its next meeting, at which time new officers would be elected. It was agreed that, inasmuch as the Queens Association had unanimously voted and urged that the entire metropolitan area be represented among the officers of the Board of Governors of Roofing Crafts Institute, that all contractors in the metropolitan area be notified of the election to take place at the next meeting, August 26.

Irving Payson Zinbarg,
Organizer.

ASSOCIATION SECRETARIES:

Your neighboring association is interested in what your association is doing, just as you enjoy reading what is being done in other sections. Write us after every meeting giving a brief report as well as what is planned for future meetings. We are especially interested in codes and the labor situation.

The Editor.

North Central States Conference

A conference of secretaries of the state associations of Michigan, Ohio, Indiana, Illinois and Wisconsin, was held in the Statler Hotel in Cleveland, Ohio on August 26, 1936.

Those attending the conference were: Frank Ederle of Grand Rapids, Mich., Paul R. Jordan of Indianapolis, Ind., C. M. Gundlach, of Sandusky, Ohio; J. J. Walters of Ottawa, Ill., Paul L. Biersach of Milwaukee, Wis., and William Feiten, A. W. Howe and M. Thesmacher of Cleveland, Ohio.

General discussions were entered into on varied problems contronting the membership in the industry, especially regarding the promotion of the best materials for use in connection with better building construction.

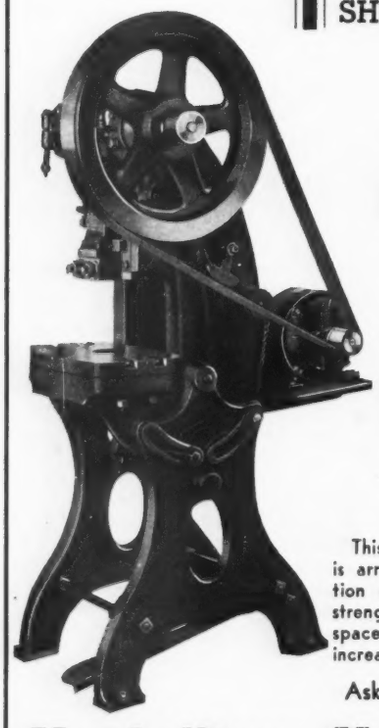
It was decided to request co-operation from manufacturers of materials, call conferences in the near future, possibly at Fort Wayne, Ind., during which time our problems can be thoroughly and intelligently discussed.

We were very much pleased to have with us at this conference Mr. A. W. Howe of the J. L. & L. A. Osborn Co. of Cleveland, also Messrs. Wm. Feiten and M. Thesmacher representing the Sheet Metal Contractors of Cleveland. Messrs. Lumm and Andrews, representing the Revere Copper & Brass Incorporated of Cleveland, Ohio were asked to sit in the forepart of our conference regarding information desired by those attending this meeting.

Paul L. Biersach.

The **MARSHALLTOWN** *Line*

PRESSES—Capacities from 10 ton to 70 ton.
SHEARS—Capacities 18 gauge to ½" plate.

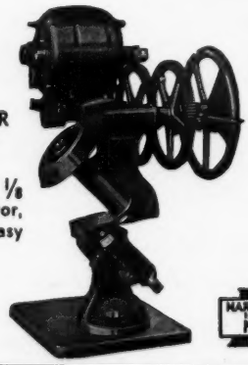


No. 18
HAND POWER THROATLESS SHEAR
For irregular cutting or straight splitting of 18 gauge sheets or lighter. Will cut sheets of any dimensions.

No. 116
THROAT SHEAR
Is especially designed for Cutting Inside Circles and Irregular Shapes

No. 2
PRESS
This ruggedly constructed Press is arranged with proper distribution of weight giving maximum strength and affording ample die space, low operating cost and increased output.

Ask Your Jobber or Write



No. 18
MOTOR POWER THROATLESS SHEAR
Complete with ⅛ HP standard motor, self-feeding and easy to operate.

Marshalltown Manufacturing Co.
MARSHALLTOWN IOWA

A Mechanic Shortage?

(*Continued from page* 15)

Rockford, Ill.

There is a distinct shortage of mechanics in Rockford and this vicinity and it is impossible to hire experienced sheet metal workers at this time. I have three young men now working as apprentices, and it will be necessary, I think, for each and every shop to take in and train at least two or three men so that they can finish the work that is being done at this time. It will be necessary to school these apprentices for three or four years so that by that time there will be sufficient mechanics to take care of the work that is going to come up in the future.

It seems to me, here in Rockford, that we have had a number of mechanics that have got past the age of doing a mechanic's job and that a number of mechanics have found good jobs in factories where at the present time they may be a foreman or assistant foreman and do not wish to quit their jobs to go back with the building trades. Therefore, it is impossible to hire good mechanics who can do all classes of work. It is up to the individual employer to hire young men and teach them the trade.

I have five mechanics that I can put on most any kind of work and I have one for forced air work, one for gravity heating jobs, one for blow pipe and general sheet metal work and one for outside work such as eaves troughs, cornices, etc., and the apprentices work with any of these mechanics. In other words, I change them off so that they can get experience in all the different classes of work.

I have been called several times by other shops wanting to know if I can spare any help, so I am sure everyone is up against the same thing I am up against.

Respectfully yours,
Alga Reece,
Secretary, Sheet Metal & Furnace Contractors Association, Rockford, Ill.

Wisconsin

The situation as to the shortage of mechanics in different parts of the country applies to this area also.

In this locality it is not only in the sheet metal industry, but also in other crafts—particularly the masons, where such a condition exists from reports which we receive from various sources.

During the depression quite a few sheet metal workers drifted into other lines and in manufacturing plants and they, now having a continuous job, refuse to come back to their old jobs for which you cannot blame them as they are working under conditions which apparently are satisfactory to them.

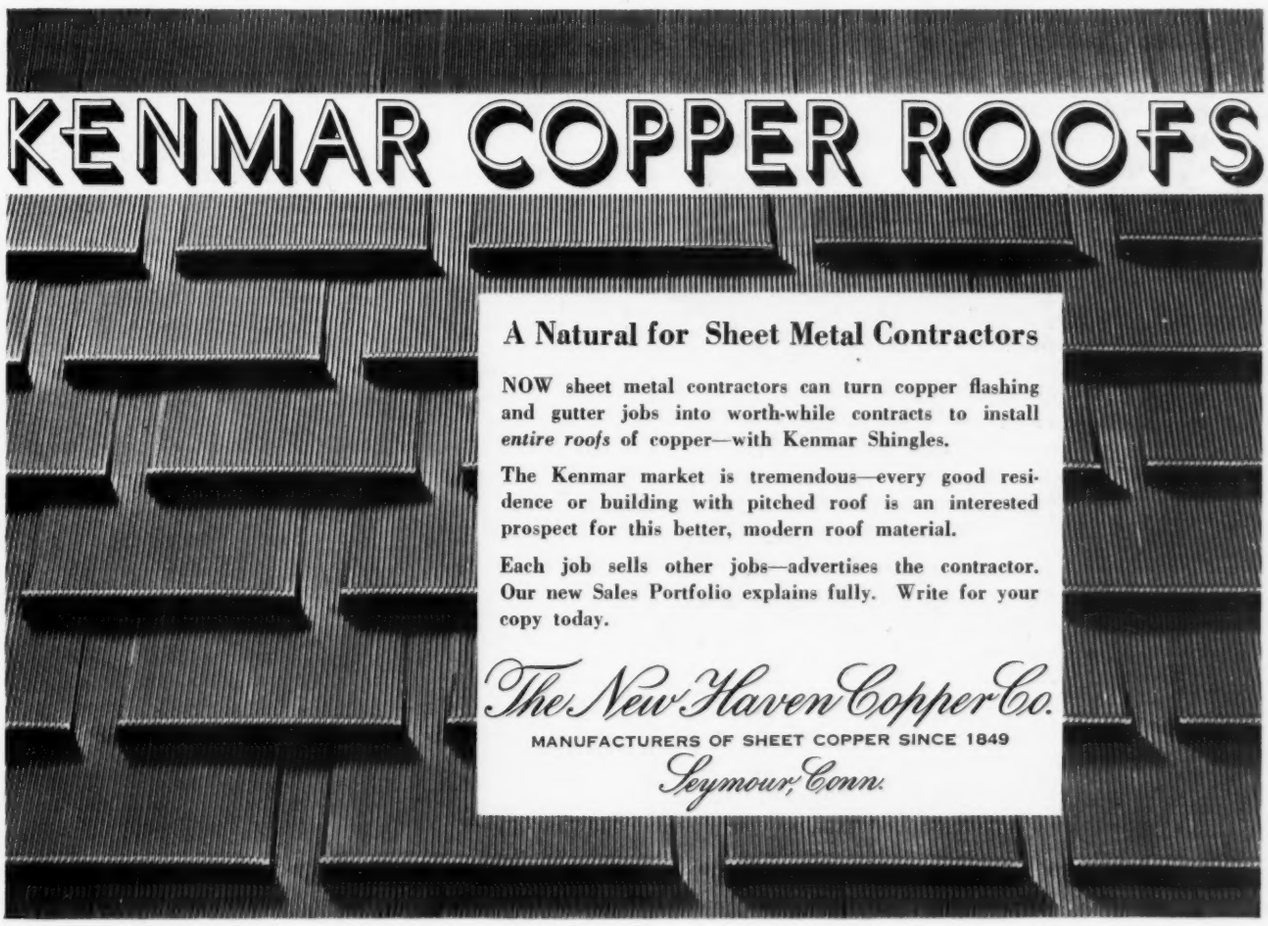
We have trade schools and apprentices here in our city which are endeavoring to supply the demand but they have been unable to do so as desired.

Yours very truly,
Paul L. Biersach, Executive Secretary, Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Assn. of Milwaukee, Wis.

Carbon Arc Welding

(*Continued from page* 87)

larger than the pipe, 8 pieces of ¼ × ¼-inch bar steel rolled and welded as shown in Fig. 5, FS, Sec. BB. Note hinges and handles, Fig. 4, FS, Sec. BB shows edge type seams. These edges should be turned up to 1/8 to 3/16 of an inch. Tack one spot, put jig around pipe and squeeze handles. This will line up the joint even all around. Note holes in jig, Fig. 5. Tack weld through these and slide clamp to next joint. After the pipe is all tacked it is well to have some kind of rollers to turn it on while welding. This will speed the welding materially. Fig. 7, details A, B, C and D, types of seams best suited for material collector construction.


KENMAR COPPER ROOFS
A Natural for Sheet Metal Contractors
NOW sheet metal contractors can turn copper flashing and gutter jobs into worth-while contracts to install *entire roofs* of copper—with Kenmar Shingles.
The Kenmar market is tremendous—every good residence or building with pitched roof is an interested prospect for this better, modern roof material.
Each job sells other jobs—advertises the contractor. Our new Sales Portfolio explains fully. Write for your copy today.
The New Haven Copper Co.
MANUFACTURERS OF SHEET COPPER SINCE 1849
Seymour, Conn.

CUT WITH A UNISHEAR

Prominent Chicago Sign Manufacturer cuts all kinds of sheet metal into all kinds of shapes with Stanley Unishears.

"Mighty Midget" Unishear Capacity up to 18 gauge galvanized iron

• Fast cutting (up to 15 feet per minute); hairline accuracy in following any design; no loss of metal; no distortion; clean edges; all of these, plus their light weight and portability, make Stanley Unishears the ideal equipment for cutting all kinds of sheet metal.

The "Mighty-Midget" Unishear with a capacity up to 18 U. S. gauge hot rolled steel or galvanized iron is now available at a new low price.

No. 16 Capacity up to 16 gauge galvanized iron

Other portable and stationary models have capacities up to ¼" boiler plate.

Ask your Stanley Distributor for a demonstration or write for full description.

No. 144 Capacity up to 14 gauge galvanized iron

STANLEY ELECTRIC TOOL DIVISION
THE STANLEY WORKS
New Britain, Conn.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 114.

321—Fabrication of Chromium Steels

The Linde Air Products Company, 205 East 42nd Street, New York City, announces a new booklet covering the fabrication of 18-8 chromium steels. The booklet includes illustrations and text covering the improvements in technique and materials. Properties of 18-8 steels are reviewed to point out the need for improved fabrication. The problem of avoiding intergranular corrosion in the base metal in zones adjacent to the welds is discussed in detail. Included is a complete discussion of actual welding procedure.

◆

322—Oil-Burning Hot Water Heater

Viking Mfg. Company, Akron, Ohio, is distributing a small leaflet illustrating and describing the Viking oil-burning hot water heater. Kerosene is the fuel. The tank is insulated, so that the "pilot" will maintain water temperature with a fuel consumption of 1½ pints in twelve hours. The Viking burner is equipped with ceramic fuel feeders with burner, plate and control all mounted together as one unit. Flue is of special design, baffled off center with condensation baffle at bottom. Tank is of Copperlow steel. Satin finish in two-tone green, chrome trim.

◆

323—Handbook of Refractories

Standard Fuel Engineering Co., 667 Post Avenue South, Detroit, Michigan, has just issued Bulletin No. 37—The Standard Hand Book of Refractories—covering Zero cements, plastic fire brick, castables, clays, fire brick, special shapes, furnaces and furnace accessories.

The Hand Book is divided into four main sections—brick, cement (plastic brick, concrete, etc.), furnaces and furnace accessories. There are charts to determine the proper cement for various purposes, incinerators, domestic oil burners, stokers, etc.; illustrations of standard and modified shapes, a table of circle brick shapes, arch, wedge, key and special shape brick and tile; with weight tables for standard firebrick and furnace accessories.

◆

324—Furnace Efficiency

"How to Build Up Furnace Efficiency," by Jos. W. Hays, combustion engineer, has made its appearance. Written in popular style and illustrated with cartoon drawings, the author gives in this volume practical suggestions for operating boilers efficiently. This eighteenth edition has been revised and enlarged, the book having been out of print for several years.

Why and how fuel is wasted, spotting and stopping fuel wastes, and how to keep fuel waste stopped, are among the subjects covered. An appendix presents considerable data that could not readily be classified under any of the chapter headings, and includes a section on efficient operation of domestic heating plants.

The book is published by the Dunes Publishing Co., P. O. box 299, Michigan City, Ind.

◆

325—New Torrington Literature

The Torrington Manufacturing Co., 44 Franklin St., Torrington, Connecticut, is distributing a bulletin illustrating and describing their propeller fans of small diameter for automobile heaters, defrosters, electric home heaters, air conditioning devices, etc. Included is a performance table and general dimensions.

In addition the company also manufactures Airistocrat quiet propeller fans designed for free air operation and against moderate pressures—in 10, 12 and 16-in. sizes.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 114.

326—Northwestern Stove Literature

Northwestern Stove Repair Co., 662 West Roosevelt Road, Chicago, Illinois, is distributing a new folder illustrating and describing Norco warm air furnaces and air conditioning units.

The company makes the Norco cast furnace, boiler plate steel furnace and a DeLuxe air conditioner. Specifications and capacities of Norco furnaces are included.

◆

327—Ajax Forced-Air Fittings

The Cincinnati Sheet Metal & Roofing Co. 226 East Front Street, Cincinnati, Ohio, is distributing a 28-page booklet entitled "Ajax Forced-Air Fittings," illustrating and describing their products—duct sections, elbows, angles, stacks, stack heads, pipe, collars, registers, vents, faces, etc., together with size and price lists.

◆

328—Automatic Coal Firing

Link-Belt Company, Chicago, has just printed three new booklets on automatic firing with coal, for boilers up to 300 H.P.

Booklet No. 1541 covers the series of automatic coal burners for the home; another (No. 1537) shows applications of Link-Belt stoker firing to commercial heating plants; and the third (No. 1538) covers automatic generation of process steam, high or low pressure. A featured improvement is the Link-Belt Airmeter, which automatically meters the right quantity of air to the fuel bed.

◆

329—Zinc Die Casting Booklets

The New Jersey Zinc Company, 160 Front Street, New York City, announces two booklets describing zinc alloy die castings.

The first booklet explains what zinc alloy die castings are, physical and mechanical properties of the material, changes from aging, corrosion resistance of alloys, recommended methods for finishing castings, recommended machining and assembling operations.

The second catalog is a pictorial presentation of hundreds of items manufactured with zinc alloy castings. Each of the illustrations also has accompanying text to explain what the product is and how alloy casting was used.

◆

330—Insulation Leaflet

The Insulite Company, Minneapolis, Minnesota, announces the publication of a leaflet designed to remove the mystery surrounding home construction and maintenance cost.

The leaflet gives an exterior elevation of a typical American small home together with floor plan. The company claims that the house can be built for around $3000. An insulation degree-day map of the United States, dividing the country into four zones, is shown to indicate the need for insulation. Detail sketches show the general construction, while other details show recommended methods of applying insulating material for the reduction of heat loss and cooling load.

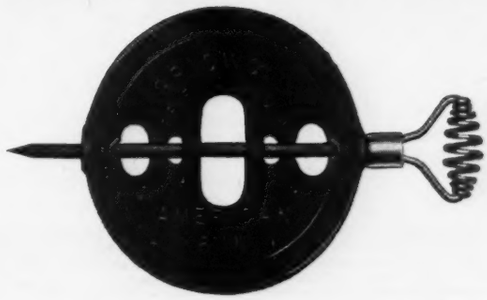
Additional sketches show the unit heat transmission for different types of construction of roofs, ceilings, walls and floors. The sketches show a cross-section of the construction accompanied by heat losses in B.t.u. per hour for uninsulated and insulated construction. Thus the home owner may be shown the value of insulation as applied to his proposed building. The savings in fuel costs for coal, oil and gas are graphically portrayed in terms of a line of trucks, tank cars and gas contained as compared to construction without insulation.

WARNING

PROTECT YOUR PROFITS
PROTECT YOUR CUSTOMERS

Beware of substitutes for Genuine Griswold

"AMERICAN DAMPERS"



Only America's fastest selling Damper gives you all these

10 FEATURES

1 Separate nickel-steel coil handle that stays cool.
2 Nickel-steel ferrule, enclosing spring to protect handle from heat.
3 Special-steel spindle easily pierces any stove pipe.
4 Hump on spindle locks damper in position.
5 Reversible plate for insertion from either side.
6 No repacking or rehandling due to improved packaging of all sizes.
7 Contents of carton stenciled on both ends.
8 Carton opens at both ends, no shavings or straw muss.
9 Most complete line of dampers. Regular size 3" to 7". Furnace, from 8" to 18". Oval from 4" to 8".
10 Made and guaranteed by The Griswold Manufacturing Company of Erie, Pa.

Beware of counterfeits of "Griswold-American" Dampers. Though a clever imitation, no substitute gives you all of the above 10 features of the genuine "Griswold-American" Damper. Order your "Griswold-American" Damper requirements in all sizes through your legitimate jobbing channels. Your jobber is in position to make immediate deliveries.

GRISWOLD

GRISWOLD AMERICAN
The Original Steel Spindle
REVERSIBLE DAMPER

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 114.

331—Furnace Leaflet

The Baker Furnace & Cleaner Manufacturing Company, 2505 Albion Street, Toledo, Ohio, announce three new pieces of contractor literature. The first piece of literature describes in detail and shows features of the Baker air conditioning system, consisting of a square cased, steel furnace with a blower-filter unit and complete automatic control.

The second leaflet describes the furnace vacuum cleaner and shows typical mimeographed sheets describing the operation and suggested prices.

The third piece of literature describes the new Baker round cased, steel furnace with pan type humidifier, hot blast for coal burning, steel body and radiator with firebrick lining and duplex grates. The furnace is made in grate sizes from 20 inches to 31 inches in diameter and with ratings from 576 to 1050 square inches of leader pipe area.

◆

332—New Moncrief Catalogs

The Henry Furnace & Foundry Co., 3471 East 49th Street, Cleveland, is distributing Catalog No. 36 covering Moncrief warm air pipe, fittings and specialties, and No. 36 AC covering Moncrief air conditioning pipe and fittings.

Catalog No. 36 contains new list prices on tin and galvanized pipe and fittings, to be followed shortly by a complete pipe and fittings catalog.

Catalog No. 36 AC illustrates different methods of purchasing and installing prefabricated duct systems, with instructions for ordering fittings, with tables of dimensions.

333—Stoker Sales Manual

A large-size, colored booklet, containing information on the relative merits of various types of fuels and firing methods, is announced by the Motorstokor Corporation, 25 West 45th Street, New York City.

The booklet points out that every method of heating is a compromise. As, for example, with an oil burner you get convenience and comfort but sacrifice safety, cleanliness and economy; with a gas furnace you secure convenience, comfort, cleanliness and safety but sacrifice economy; but with the company's stoker it is claimed that you secure all these desirable results.

It is not anticipated that everyone will agree with the conclusions shown in the leaflet, but contractors interested in the sales claims made for stokers, as compared to gas furnaces and oil burners, can obtain a copy of the booklet by addressing the company.

◆

334—Oxwelding Brass and Bronze

The Linde Air Products Company, 30 East 42nd Street, New York City, announces a 12-page, illustrated booklet on the oxy-acetylene welding of brass and bronze.

The first of the two main sections to the booklet is devoted to the technique of fusion welding brass and bronze. For ornamental work, it is essential that the welds have exactly the same appearance as the base metal. Furthermore, the weld must be so made, and the material in it must be such, that, as time progresses, the weld will remain indistinguishable from the base metal. The securing of this uniformity of appearance depends upon the flame adjustment used, and upon the constitution of the base metal and the welding rod. Methods of determining the type of flame and welding procedure in general and special cases are given.

The booklet also contains an illustrated section on the welding of commercial yellow brass pipe.

STOP FURNACE LEAKS and INCREASE PROFITS
WITH
NU-DRY FURNACE CEMENT

Because . . . .

It comes to you in dry form, takes less material to set a furnace, DOES NOT CRACK, POWDER OR BLOAT WHEN FURNACE IS FIRED IMMEDIATELY AFTER APPLIED, will not shrink, keeps joints tight at all times, stands high temperatures, is not affected by temperature changes. There is no loss because it does not get hard in containers, and requires only five and one-half pounds where you ordinarily use ten pounds of plastic.

The following jobbers and furnace manufacturers use and stock Nu-Dry Furnace Cement. Ask them about it.

Akron, Ohio
XXth Century Heating and Ventilating Co.

Buffalo, N. Y.
J. M. and L. A. Osborn Co.

Cleveland, Ohio
Forest City Foundries Co.
Henry Furnace & Foundry Co.
J. Kinsner and Son Co.
Ohio Sanitary Specialty Co.
J. M. and L. A. Osborn Co.

Cincinnati, Ohio
Cincinnati Stamping Co.
The Huenefeld Co.

Columbus, Ohio
Vorys Bros., Inc.
Munkle Heating Co.

Dayton, Ohio
Direct Plumbing Supply Co.

Detroit, Michigan
Detroit Safety Furnace Pipe Co.
Ideal Furnace Co.
J. M. & L. A. Osborn Co.

Fort Wayne, Ind.
Wayne Pattern and Foundry Co.

Grand Rapids, Mich.
Behler and Young Co.
W. C. Hopson and Co.

Philadelphia, Pa.
Adelta Stove and Mfg. Co.

Pittsburgh, Pa.
Demmler Bros. Co.
Heating Supply Co.
Henry Furnace and Foundry Co.
A. H. Johnson Co.

Peoria, Ill.
F. Meyer and Bros. Co.

St. Louis, Mo.
A. G. Brauer Supply Co.
Hammond Sheet Metal Co.

Toledo, Ohio
C. F. Throm and Sons

THE PYROLITE PRODUCTS COMPANY
1221-31 W. 74TH ST., CLEVELAND, O.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 114.

335—Peerless Foundry Price List

Peerless Foundry Company, 1845 Ludlow Avenue, Indianapolis, Indiana, is distributing price list No. 36 covering repair parts for furnaces and boilers, both obsolete and under production.

◆

336—Heating Unit Folder

Controlled Indoor Climate for New and Old Buildings is the title of a new four-page folder being distributed by Nelson Company, 2604 Fourth Avenue, Detroit, Michigan. The company now manufactures the Bertossa unit and there are models for oil, gas and coal. The ratio of compact heating surface to the grate area is said to assure a maximum of efficiency and economy of operation. These units in eight sizes are adaptable for residence, church, school and industrial buildings. Capacities range from 100,000 to 2,800,000 B.t.u. per hour.

Air conditioners in two series are made in capacities from 600 to 5,000 C. F. M. AF models are with filters, while the AC models are complete with air washers and filters.

The oil burner is of the gun type and will burn No. 3 fuel in suspension, is said to be quiet and efficient and was designed especially for the Nelson-Bertossa unit.

◆

337—New Ideas for Better Homes

Johns-Manville, 22 East 40th Street, New York City, announce a new 16-page book under the title "New Ideas for Better Homes," which covers not only improvements made with J-M insulating materials, but practically every other kind of home improvement in the field of plumbing and heating. The aim of the book is to create a desire on the part of home owners for complete modern kitchens, bathrooms, laundries, heating equipment, etc. Photographs show old, outmoded kitchens and baths contrasted with the same rooms remodeled and containing new fixtures.

The covering of furnace and warm air supply pipes is urged by means of text and illustrations. The home owner is shown what can be done in the way of remodeling basements for recreation rooms, etc.

The company also announces that a moving picture, showing just how this new book and the ideas presented can be used to sell home improvement jobs, is scheduled for presentation in cities throughout the country. Information on where and when the film will be shown can be obtained by addressing the company.

◆

338—Sales Manuals

Three sales manuals, for use by salesmen, have been published by Delco Appliance Corporation, Rochester, New York. The titles of these three bulletins are: "Out of the Night," "Proof" and "Today."

"Out of the Night," is a bulletin designed to explain to the home owner how progress has been made from the most primitive forms of heating on up to the present highly developed air conditioner. The elaborate presentation of photographs, drawings and text material explains what the Delco Company has done to bring comfort and health to home owners. Views of the Delco air conditioning furnace and air conditioning boiler, also numerous typical installations are included in the catalog.

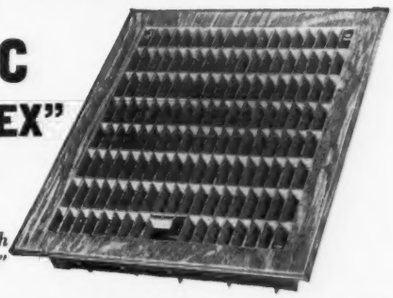
The booklet, "Today," discusses in detail the features of safety, economy, health, cleanliness, comfort, convenience and investment increase secured by modern heating systems and backs up each of these advantages with illustrations of residences and statements by home owners.

"Proof" is a compilation of testimonial letters.

By Popular Acclaim!

The Finest "Grid"-Type FLOOR REGISTER

H & C "NO-FLEX" No. 210



Standard Mesh 7/16" x 1 7/16"

The way users of "grid" type floor registers and return air faces are turning to these two H & C numbers makes it perfectly evident that their superiority is real!—something to be seen at a glance, and decidedly worth-while.

If you haven't as yet actually inspected them, do so at once! You'll like the way they're made. Narrow "heel-proof" mesh, flush intersections for better appearance, margins that are straight as a die and narrow for close installation—bevelled for added strength, invisible corner joints, carefully aligned members, and unusual air capacity. And note, too, that each item is carefully packaged to reach the job unmarred.

The better the registers, the better the impression you leave with your customers. Be sure to use the best. Why not contact your H & C jobber today?

RETURN AIR FACE

H & C "NO-FLEX"

No. 265

Standard Mesh 11/16" x 1 7/16"

HART & COOLEY MANUFACTURING CO.

Warm Air Registers Regulator Sets H&C Air Conditioning Grilles Dampers · Chain

61 W. KINZIE ST. · CHICAGO · ILLINOIS

In Canada: Fort Erie N., Ontario

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 114.

339—Friez Air Conditioning Products

Julien P. Friez & Sons Inc., 4 No. Central Avenue, Baltimore, Maryland, is distributing Bulletin K—a condensed catalog of air conditioning products as of July, 1936.

This bulletin covers Friez humidistats, windowstats, insertion controls and indicators, portable recorders, hythergraphs, electric recorders (for humidity and temperature), comfortrols, dual control instruments, humidity and temperature indicators, relays and complete control assemblies, air meters and draft gauges, psychrometers (pocket sling and standard sling), hand-aspirated psychrometers, thermo-shielded electrically-aspirated psychrometers and anemometers.

◆

340—Dust Engineering

American Air Filter Company, Inc., First and Central Avenue, Louisville, Kentucky, announce that the small publication "Dust Engineering," which was begun as a compilation of the company's advertising, has proved so popular that the information contained in the original issues is now being presented in the form of a monthly house organ. The second issue of the organ features Roto-Clone, a single unit blower and dust separator, which is said to save considerable space, may be located at or near the source of the dust, and considerably reduces the over-all resistance of the collecting system. An article on the dust cleaning efficiencies of Roto-Clone shows photomicrographs of quartz dust samples taken from a cyclone and Roto-Clone showing the greater cleaning effectiveness of the new apparatus. Another article describes the comfort obtained by hay fever sufferers through the use of filtered air. An interesting short story relates the experience of transcontinental railroads in their air conditioned cars passing through the dust storms of the Southwest area last spring. The company announces that anyone wishing to be placed on the mailing list to receive the booklet should write to the Sales Department.

◆

341—G-E Oil Furnace

General Electric Company Air Conditioning Department, 570 Lexington Avenue, New York City, has just published a book, 11½x14¼, entitled "Automatic Heating with Oil," which sets forth the advantages of General Electric automatic oil heat.

Fuels, combustion and the three types of heating are described, as well as the methods of distribution of the heat produced.

In the G-E system of preparing and burning oil, the oil is broken up into minute particles and mixed with the proper quantity of air before being discharged down through an orifice into the large combustion chamber under less than atmospheric pressure. Heat is then applied to raise it to its "kindling" temperature. The flame is conical in shape, burning on the outside surfaces while the atomized oil inside of this flaming cone is being changed to gas by the heat of the flame. At the right moment, a second supply of air is introduced at the bottom.

The G-E warm-air conditioner is known as the "direct-fired" type. Specifications call for a two-tone gray and black steel cabinet with chromium trim, less than 3 ft. wide, 6 ft. high and 5 ft. long; electrically welded; clean without escaping gases or odors; burns cheaper grades of fuel oils; automatically controlled; burner unit sealed-in-steel; motor self-lubricated with furnace oil; burner nozzle air-cooled; ignition by 12,000-volt spark; slow-speed fan with flexible suspension for quietness; moisture supply adjustable for any condition; dust removed by filters.

REPAIR PARTS....

If you need a part for any type furnace or boiler . . . need it quickly . . . and want to make sure that you get it on time . . . ORDER FROM PEERLESS. Our stock of repair parts is most complete . . . our facilities for quick shipment most efficient. You will find it a pleasure and a saving to deal with Peerless for your repair parts . . . and you will earn your customers' thanks for the snappy service you have rendered. Be convinced . . . try Peerless on your next order.

SEND FOR THIS BIG 96-PAGE CATALOGUE NOW

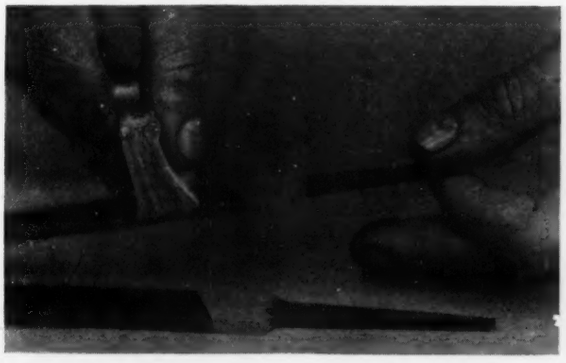
PEERLESS FOUNDRY COMPANY 1853 LUDLOW AVE. INDIANAPOLIS, IND.

Kinks . . . .

Practical kinks on methods, special equipment, handy ways of doing things are invited. Kinks published will be paid for at the rate of $1.00 for an item without illustration and $2.00 for items with photographs or drawings.—The Editors.

To Clean File Teeth

Oil is often spilled over and gets into the fine teeth of files. It is hard to clean with things at hand around the bench. Saw one or two blocks of paper out of the back of any old pulp or soft paper magazine, making a pad some 1½" wide and about 3" long. Work this pad or block of



paper firmly down into and back and forth through the teeth of the file as shown. The soft absorbent blotter-like nature of the ragged cut face of the paper will easily and quickly take up and remove all the oil from the teeth and out of the grooves of a file no matter how fine the teeth may be.

◆

Removing Stubborn Screws

There are two outstanding reasons why screws are often hard to remove from wood. One is that moisture was either present on the screw, or the wood into which it was driven had a relatively high moisture content when the screw was driven. The screw later became rusty in consequence, and since rust always expands, became more tightly than ever locked in its setting. The other reason is mistreating a screw in driving. If the slot shears at the final turn on the screw, it will be very hard to remove unless and until a better slot than the crippled one is formed.

Take an old discarded file and break off a section about four inches long. Grind this at one end to form a tool which can be used, in combination with a light hammer, as a chisel to cut the crippled slot deeper and into clean form so that a good hold can be had with the screwdriver bit to back out the screw.

In the case of a rusted screw, use heat. Heat up a piece of steel rod to a cherry red at one end in the forge, apply the heated end firmly to the head of the screw, and hold it there. If necessary, play the flame from a blowtorch on the hot rod end a couple of inches back from the wood in order to get additional heat into the screw without burning the wood. In extreme cases, punch a hole the size of the screw head in a piece of asbestos paper, and apply over the work to mask and protect the wood from the heat. The heat passing into the screw will expand it and force the wood to expand around it. Later, as the heat passes out of the screw, it will contract, leaving it relatively loose in its setting, and in most cases it can be quite easily withdrawn.

Here's a better, *less expensive* and *more profitable* way to repair firepots

Before

FROM NOW ON until late in the spring you can keep busy installing FIRELINE at $10.00 per hour (labor profit). After last winter's severe cold one out of every three furnace firepots is burned out and hundreds of home owners in your territory will jump at a chance to have you FIRELINE their firepots if you tell them how little it costs, how quickly it's done, and how FIRELINE (1) Eliminates Smoke, Soot and Gas. (2) Increases heat producing capacity. (3) Cuts fuel bills from 10 to 20 per cent. (4) End need of ash sifting. (5) Protects firepots from burning out.

After - Cracked, Broken or Burned out firepots can be repaired in an hour without taking down the furnace. Literally better-than-new for this efficient refractory lining protects them indefinitely and increases heating capacity.

Ends the "casting problem", Fits all Makes.

Coming in sealed tins, plastic and easily molded to any form, FIRELINE fits *all* firepots regardless of size, shape, type or age. It ends the re-placement casting problems—inventory losses resulting from obsolescence, orphan firepots no longer manufactured, high transportation costs on heavy castings from distant points, delays and heatless days, kicks and complaints, etc., etc. With a supply of FIRELINE in your shop you can give ½-day service and a better job for a fraction of the cost—and when you can do that you are certain to get the business.

There's No Limit to What You Can Earn.

Every firepot in your territory offers you a chance to make $10 per hour—old ones to be repaired, new to be protected and made more efficient. It's up to you how much you make out of this opportunity. We supply sales literature, signs, mats for your newspaper advertising, complete instructions—how to install, what to charge, etc. Get this information now; every day you delay means money lost.

Send in the Coupon Now

FREE Sample Coupon

Fireline Stove & Furnace Lining Co.
1866-I Kingsbury St., Chicago, U. S. A.

Gentlemen: Please rush Free Sample and full information

To .....

Address .....

City ..... State.....

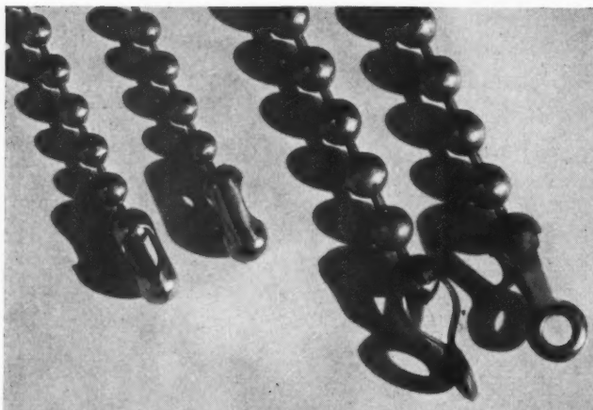
FIRELINE

(Copr., 1936, Pilbrico Jointless Firebrick Co., Chicago.)

ALL REPAIR PARTS for FURNACES BOILERS STOVES RANGES

NO matter how small, how large, how old or how new, repair parts for any heating appliance can be secured from Brauer, a most efficient and reliable source of supply . . . with the RIGHT PRICE.

A.G.BRAUER SUPPLY COMPANY
316 NO. THIRD ST. + SAINT LOUIS
IN STOCK • READY FOR IMMEDIATE SHIPMENT



BEAD CHAIN*

This non-kinkable, smooth running chain, of swiveled metal beads, improves every job —in appearance and service. It is ideal for ventilator, skylight, heat control and other regulators. In standard sizes, metals and finishes, with couplings and pendants for many uses. Ask your jobber.

THE BEAD CHAIN MANUFACTURING CO.
*TRADE MARK REG. U. S. PAT. OFF.
BRIDGEPORT, CONN.

News Items . . . . . .

Joseph Meyer, Buffalo, in Trade 57 Years

Joseph H. Meyer, president of the oldest established sheet metal and furnace shop in the city of Buffalo, has been active in the industry for 57 years. He celebrated his 71st birthday on April 16th of this year.

Mr. Meyer started to learn the trade at the age of fourteen years. His present business was started on May 1st, 1900.

Clarence J. Meyers, a son, is vice-president of the company.

◆

C. E. Carr & Co., Columbus, Ohio, Moves

C. E. Carr and Co., Columbus, Ohio, of which C. E. Carr president and general manager, started in 1919, has recently moved its plant from 163 North Fourth Street to property purchased at 49-53 East Naghten Street where it has almost 11,000 square feet of floor space in its distribution and manufacture of stock equipment, plumbing supplies, sheet metal specialties etc.

The first floor is devoted to offices and display rooms, the second and fourth to storage and the third floor has been converted into a modern sheet metal specialty manufacturing plant where the production of stock tanks, feeders, waterers, poultry equipment, septic tanks and barn supplies obtains on a larger scale than before.

During the past ten years the firm has placed on the market a number of patented sheet metal devices for stock and poultry use.

◆

Air Conditioning Correctly Defined

William B. Henderson, Executive Vice-president of the Air Conditioning Manufacturers' Association, in an address before the National Association of Building Owners and Managers Convention at Dallas, Texas, on May 27, 1936, said: "An air conditioning installation results from the pooling of many single items of equipment into an assembly by a competent engineer in such a manner as to produce a specified atmospheric result within an enclosed space.

"That there has been widespread deception, some voluntary and some involuntary, through misuse of the term 'air conditioning' is, unfortunately, all too common knowledge. The only remedy for this situation and for the protection of the public is the dissemination of as much factual information as possible concerning air conditioning, and dispelling from the mind of Mr. and Mrs. Public all mystery about controlled weather. This is the plain duty of all forward-looking manufacturers of air conditioning."

Mr. Henderson stated that the National Better Business Bureau, after consulting with leading air conditioning authorities, engineers, trade associations, architects, and technical societies, published its opinion as to what constitutes minimum requirements of air conditioning in a Bulletin:

"That air conditioning is the scientific preparation and simultaneous control of the atmosphere within a structure;

"That Summer air conditioning means *at least* the cooling, dehumidifying and circulating of air; and

"That Winter air conditioning means *at least* the heating, humidifying and circulating of air."

Mr. Henderson stated that buyers of air conditioning will continue to be fooled despite the efforts of the Federal Trade Commission and the National Better Business Bureau, but not to as great an extent as formerly. The deception will continue with at least a degree of success until the public knows what air conditioning is. The job of education must be undertaken by the industry, by its customers, and by the business, civic and governmental bodies whose duty it is to prevent the fleecing of the buying public.

WHITNEY No. 4-B PUNCH

This punch for sheet metal work has a capacity of ¼-in. through 16 gauge. Weight 3 lb. Length 8½-in. Depth of throat 2-in. Complete tool includes three punches and three dies of specified sizes with die adjusting key.

THE WHITNEY LINE

In the W. A. Whitney line of Hand Lever Punches you will find a portable hand lever tool suitable for every requirement. They are made in ten sizes and types, ranging in size from the Tinners No. 4 Punch, which punches ¼-in. hole through 16 gauge iron to the No. 92 Punch, capable of punching a 2-inch hole through ⅛-in. stock. Each tool has its special field of work as recorded in our latest catalog.

WRITE FOR CATALOG

W. A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL.

NEED PARTS?

. . . . Maybe you don't at the present time, but you will as soon as the furnace repair season gets in full swing.

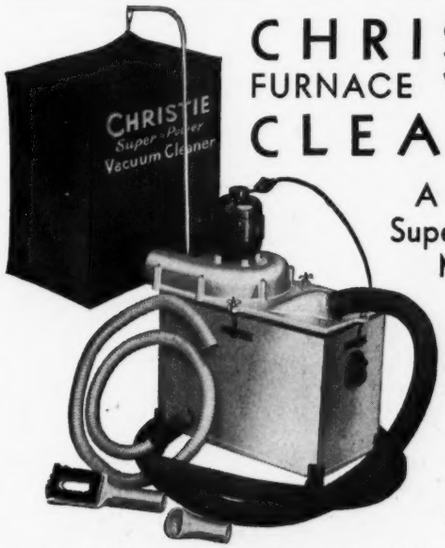
And the most reliable source of guaranteed furnace repair parts is CENTRAL. Last winter was tough on furnaces and many homeowners who can't afford new heating plants will repair the old ones. There's your spot to make money. Show them how dependable, economical repairs can be made with CENTRAL parts and you'll clinch every job.

Then if you should run across a prospect seriously considering a new heating plant, we have a dandy new 1936 line of warm air furnaces and air conditioning units.

Send for literature. You'll be able to get exactly what you need without delay.

CENTRAL FURNACE & STOVE REPAIR CO.
3937 OLIVE STREET ST. LOUIS, MISSOURI

CHRISTIE FURNACE VACUUM CLEANER



A One-Man Super-Powered Machine

$99.50

(Subject to Change Without Notice)

F. O. B. Cincinnati with Tools and Attachments

This is the same high quality machine that is known to furnace dealers everywhere as the most powerful, one-man cleaner on the market. Built by practical furnace men.

Quantity production and large purchasing power enable us to make this sensationally low price. Includes tools and attachments. Folder "A" mailed upon request.

We also manufacture the "Christie Giant" to operate from truck or yard.

Sold by Jobbers and Furnace Manufacturers.

DISTRIBUTORS WANTED: Write for interesting proposition.

CHRISTIE CLEANER COMPANY
Division of The Cincinnati Sheet Metal & Roofing Co.
226-30 East Front St. Cincinnati, Ohio

NU-DRY FURNACE CEMENT

Unexcelled for FALL AND WINTER JOBS

Use Nu-Dry and have a gasket in the joints which will not crack or powder by the expansion and contraction of the castings when they are heated and cooled. It comes to you in dry form . . . takes less material to set a furnace. DOES NOT CRACK, BLOAT OR POWDER WHEN FURNACE IS FIRED IMMEDIATELY AFTER APPLIED . . . Will not shrink . . . keeps joints tight at all times . . . withstands high temperatures . . . and eliminates material losses for it does not harden in containers.

Write today for literature

PYROLITE PRODUCTS CO.
Refractory Engineers
1221-31 W. 74TH ST., CLEVELAND, OHIO

The PREMIER FURNACE CLEANER

Now!!! Premier announces a complete line of Premier Furnace and Boiler cleaners. Not just one model, but a complete line of four models covering a price range that brings this powerful cleaning service within your means. Models with ½ H.P. motors and a maximum water lift of 31 inches are priced, completely equipped, at $55.00 and $59.50. Models with 1 H.P. motors and a maximum water lift of 46 inches are priced, completely equipped, at $79.50 and $84.00. All cleaners are of the highest quality and are manufactured by one of the world's largest and oldest exclusive vacuum cleaner manufacturers.

Write or Wire for Details Today.

$55.00 TO $84.00

Standard Equipment for $55.00 and $79.50 Models

12 foot Metal Hose.
6 inch Bristle Brush.
5 inch Nozzle.
Guard.
Blower.
Adaptor.
Curved Cleaning Tool.
Hose Protector.

Special Equipment for $59.50 and $84.00 Models

6 foot Metal Hose.
10 foot Rubber Hose.
28 inch Flat Steel Tube.
5 inch Nozzle.
6 inch Bristle Brush.
6 inch Wire Brush.
4 inch Scraper Nozzle Coupling.

Buy It From Your LOCAL JOBBER

ELECTRIC VACUUM CLEANER CO., INC.
1734 Ivanhoe Rd. Cleveland, Ohio

HERE'S a saying that I ran across in some of my father's old papers. Maybe it will strike you as it did me.

"When the one great Scorer comes to write against your name, he writes not that you won or lost, but how you played the game."

It's a good maxim of any business. We apply the principle to heating and are still doing our best to build good heating and air conditioning equipment.

H. P. MUELLER, Pres.

L. J. MUELLER FURNACE COMPANY
MILWAUKEE, WIS.

MUELLER-MILWAUKEE

News Items . . . . . .

Sheet Metal and Warm Air Heating Records

C. A. McDade and Sons, 1066 Madison Avenue, Montgomery, Alabama, show interesting departments on sheet metal work and warm air heating. Construction records this summer have surpassed records for several years and the proportion of sheet metal roofing is considerable.

◆

Attic Ventilation in Little Rock

J. T. Hornibrook of the Stuart Roofing Co., 209 E. Markham St., Little Rock, Arkansas, reports considerable attic ventilation, air conditioning and heating this summer season. The roofing and sheet metal departments have been quite active.

◆

Need for Retail Store Modernization

An analysis of the physical condition and appearance of approximately eight thousand small and medium-sized stores and service establishments in 23 selected cities of the United States has revealed that over half are in need of modernization in varying degrees, according to "Store Modernization Needs," a study made available on August 31 by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

The analysis revealed a generally unsatisfactory appearance of store fronts.

◆

Lee Wagener Fabricates Sign

The huge coffee pot shown in the photograph was built and erected by the Lee Wagener Co., Peoria, Ill., sheet metal contractors, for the Peoria Coffee Roasterie, 630 Main St. These people are wholesalers and retailers of coffee, tea and spices.

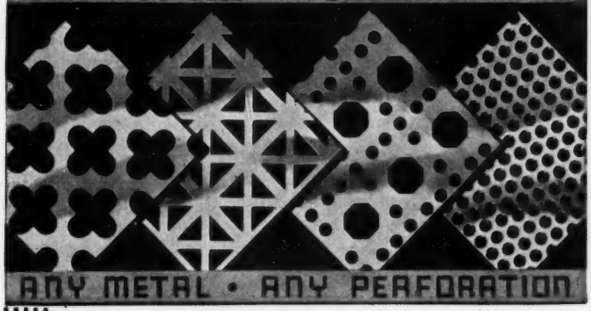
This coffee pot is five feet in diameter at the bottom, three and one-half feet in diameter at the top, made of 22-gauge galvanized steel. The bottom proper is made of wood, lined on the

outside with steel. A trap door of sufficient size to permit a mechanic to work on the inside is located in the bottom. The handle is made out of one inch electric conduit pipe. The bail is of four-inch round conductor pipe. The knob is made of three tin 10½-inch diameter wash basins soldered together.

The total cost of material amounted to $22.05, the labor amounting to $39.00, which is rather a low cost.

PERFORATED METALS

Industrial and Ornamental



Industrial Perforations include all sizes of round, oblong, and many special shaped perforations, for Screening, Grading, Draining and Guarding purposes. Our line is very complete.

Ornamental Perforations are used in Architectural Grilles, Radiator Enclosures, Metal Furniture, Cabinets, Stoves, etc. In addition to the standard shapes we have many exclusive and attractive designs suitable for different uses.

H&K workmanship is unsurpassed.

Write for prices and other information.

The Harrington & King Perforating Co.

5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

FURNACE MEN! ATTENTION!

There are plenty of homeowners thinking about furnaces for the coming winter. Last year's cold winter took the dying gasp from many an old furnace, and the people want real value and assurance of heating satisfaction when they invest their money in a new heating plant. That's what Favorite gives them.

It will pay you to acquaint yourself with the many points in favor of the Hermetic Favorite Furnace. Investigate its fine modern construction, proved fuel economy and excellent dealer proposition and then go after those potential sales.

It won't take long to get them. Show them why the Hermetic Favorite is far superior and they're sold. Don't delay. Write for free literature now!

Repair parts furnished for all Hermetic and Favorite Furnaces, also for any model Favorite Gas, Cook or Heating stove.

FAVORITE MFG. CO.

PIQUA OHIO

"BB"

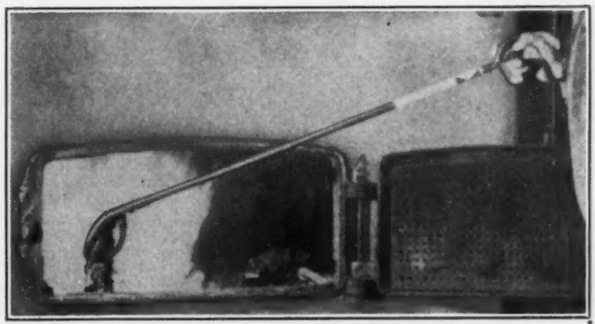
The Mark of Quality

BERGER BROTHERS CO.

229-237 Arch Street, Philadelphia, Pa.

EAVES TROUGH
GUTTER HANGERS
CONDUCTOR FASTENERS
MITRES
END PIECES AND CAPS
CONDUCTOR HEADS
ORNAMENTAL STRAPS
VENTILATORS, ETC.

Write for catalog of the "BB" Line
Buy from your jobber



NORCO "HANDY-ANDY" CLINKER TONGS

THE new Handy-Andy clinker tongs are designed to remove quickly and easily the largest clinkers in the firebox. Operation is extremely simple, weight is less than two pounds, and the handle is long enough to prevent burning of the hands.

Here is an excellent sideline for stoker manufacturers and dealers. It will return handsome profits when tied up with stoker sales.

Write today for literature.

Northwestern Stove Repair Co.

662 West Roosevelt Road, Chicago, Ill.

Manufacturers of Furnace, Boiler and Stove Repair Parts

"370 SPECIAL"

TINNER'S
RED OXIDE ROOF PAINT

The Standard of Quality

Sold only through recognized Sheet Metal Jobbers

Lyon, Conklin & Co., Inc., Baltimore & Washington
Stichter Hardware Co., Reading, Pa.
The J. M. & L. A. Osborn Co., Cleveland, Detroit, Buffalo
Rockford Sheet Steel Co., Rockford, Ill.
Arnold Supply Co., Birmingham, Ala.
Herr & Co., Lancaster, Pa.
Follansbee Brothers Co., Pittsburgh, Pa., Rochester, N. Y.
Eagle Roofing and Art Metal Works, Tampa, Fla.
The Moise Steel Co. of Ohio, Cincinnati, O.
Vorys Brothers, Inc., Columbus, O.
McClure-Johnston Co., Pittsburgh, Pa.
Demmler Bros. Co., Pittsburgh, Pa.
W. F. Angermeyer & Co., Pittsburgh, Pa.
F. D. Mitchell, Albany, N. Y.

Manufactured by

THOMPSON & COMPANY
Since 1847
P. O. BOX 6757 PITTSBURGH, PA.

A PROFITABLE JOB IN EVERY BASEMENT —AND THE SUPER GETS YOU THERE!

There's good money in the repairs and replacements which you get through cleaning heating plants. And with a sturdy, quick, one-man machine like the Super Red Streak, you make big profits on the cleaning itself! Now is the time to cash in! Cleaning jobs never sold so easily before. You can nearly always uncover the need for new grates, firepot, a re-set job or for an entire new plant.

----------USE THIS COUPON----------

The National Super Service Co.,
1944 North 13th St.,
Toledo, Ohio.

Send your Plan Book without cost and tell me about your free trial plan on THE NEW HIGH-QUALITY LOW-PRICED RED STREAK CLEANER.

Name .....

Street Address .....

City and State .....

With the Manufacturers . . .

New Friez Factory Representatives

The Air Conditioning Instruments & Controls Department of Julien P. Friez & Sons, Inc., Baltimore, has recently appointed the following new factory representatives: W. L. Byrne, 4 Smithfield Street, Pittsburgh, Pennsylvania; Russell R. Gannon Company, 519 Main Street, Cincinnati, Ohio.

◆

Wickwire Spencer Pacific Coast Manager

H. A. Larsen, formerly manager of structural products division on the west coast for the Wickwire Spencer Steel Company, 41 East 42nd Street, New York City, has been appointed Pacific Coast sales manager for all of the company's products. Mr. Larsen will make his headquarters at the San Francisco office of Wickwire Spencer, 101 Townsend Street.

E. A. Tanner, general sales manager of the Milcor Steel Company

Tanner Becomes Milcor General Sales Manager

Louis Kuehn, president of the Milcor Steel Company, Milwaukee announces the appointment of Earl A. Tanner as general sales manager, effective September 1, 1936.

For the past six years Mr. Tanner has been general manager of the company's eastern plant at Canton, Ohio.

Previous to his appointment as general manager of the Canton Plant, Mr. Tanner was manager of jobbing sales for the company. He was made a vice-president in 1931.

◆

Lincoln Electric Staff Transfers

The Lincoln Electric Company announces the following changes and promotions in its sales personnel. J. S. McKeighan has been transferred to the sales staff and is stationed at 1712 Catalpa Drive, Dayton, Ohio. J. B. McCormick has been transferred to the Pacific Coast, at 3160 Montecito Avenue, Fresno, California. Paul W. James has been transferred to Binghamton, New York.

◆

Republic Steel Promotions

Julius Kahn, president since his founding of Truscon Steel Corporation 33 years ago, has resigned his position to become vice-president in charge of Product Development of Republic Steel Corporation, Cleveland, Ohio. Forrest H. Ramage has been promoted to Sales Promotion Manager with the new Product Development division. Stanley A. Knisely has been named Director of Advertising with direct supervision of all advertising of the corporation and its subsidiaries, with Chester W. Ruth as his assistant.

UNIVERSAL BENDER. Simple to operate. Nothing to get out of order.
Capacity, ½"x2". Bends cold. Smallest square 3"x3" cube.

WHITNEY METAL TOOLS

Use Whitney tools in your shop. We manufacture a full line. Only a few of the many items can be shown in this advertisement.

RIVET SETS. Whitney rivet sets are drop-forged from the highest grade steel and designed to fill every requirement. Sold in 10 different sizes.

IMPERIAL ROLLER BEARING PUNCHES. Offered in 3 sizes. Will work inside 90 degrees. Quick changing for punches and dies. No cams to wear. Stripping positive.

RIVET PUNCHES & DIES. We can supply a complete assortment of rivet punches and dies from stock.

Good tools are essential to a profitable business. Make it a habit to use Whitney tools and to consult us on any tool problem.

WHITNEY METAL TOOL CO.
91 FORBES STREET ROCKFORD, ILLINOIS

A Complete Line of Furnaces Means . . . . . .

• BIGGER PROFITS

Here is a complete line of cast iron or steel furnaces, either gravity or forced air types that give you a complete range of styles, and priced so that you can meet all competition. When you handle the Liberty Line you can quote on all installations regardless of size or type of firing, giving you larger volume of sales which means Bigger Profits.

HEATING FRONT RANK SYSTEMS TRADE NAME REGISTERED

The FRONT RANK gravity type warm air furnace is the result of 45 years of knowing how to build furnaces with high efficiency and economy. Heavily constructed of high quality steel, rigidly riveted and welded with tubular type radiator. The FRONT RANK Crescent is also of steel construction but is equipped with crescent type radiator to give higher heat radiation. The new FRONT RANK DeLuxe is the last word in forced type warm air conditioners. Entirely automatic with balanced humidifying and temperature controls it meets the demand for the most modern dwellings. It can be equipped with oil or gas burner, automatic stoker or can be hand fired.

The Mellow warm air furnaces are America's Perfect Heating units. They are made of solid cast construction and are designed for high efficiency and long life. They are manufactured in gravity type, as well as in the more advanced forced air types that condition air. They, like the DeLuxe Front Ranks, have automatic humidity and temperature controls and can be equipped with gas or oil burners, automatic stokers or can be hand fired.

MELLOW WARM AIR FURNACE

Distributors and Dealers

Here is a line you should investigate. The Furnace season is at its peak right now so you better write for complete information.

LIBERTY FOUNDRY CO.
St. Louis, Mo.

"CHRONAT"...

Furnace Repair Parts

National has parts for every make of furnace and every piece it makes carries the label

A PRODUCT OF THE NATIONAL FOUNDRY & FURNACE CO. TRADE MARK CHRONAT IRON RESISTS WEAR AND FIRE

It's the label you should show your customer—it identifies better-fitting and longer-life castings.

No extra cost—send for Catalog No. 24 showing furnace numbers and prices for parts of all makes of warm air furnaces.

THE NATIONAL FOUNDRY & FURNACE CO.
Sta. B
DAYTON, OHIO

PERMANENT • INEXPENSIVE

. . . and that's not all! When you talk CANTON Steel Ceilings you have many points to help you convince your prospects that steel ceilings are exactly what they need. Fireproof, permanent, neat appearing and no danger of injury or damage suits resulting from falling plaster.

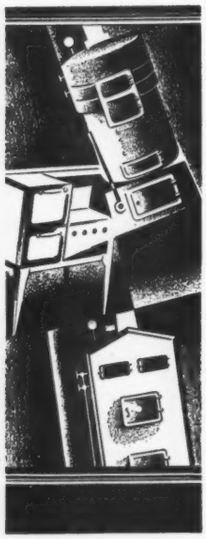
CANTON Steel Ceilings mark the owners as discriminating buyers, who recognize the value of a permanent, beautiful ceiling and the contractors as men who take into consideration the welfare of their customers and at the same time make themselves a handsome profit.

Why not build yourself a profitable trade with this modern ceiling line? Write today for literature.

Sold through all leading Sheet Metal jobbers.

CANTON STEEL CEILING COMPANY
2280 WINFIELD WAY, S. E. CANTON, OHIO
Warehouse Service: 497 West St., New York City, and Canton, Ohio

You get . . A Tighter Joint
And . . . . It Stays Tight
with
LACLEDE FURNACE CEMENT



Prove for yourself its enduring strength & ultimate economy.

•

FREE TRIAL OFFER
We invite you to examine and test a free sample of
LACLEDE FURNACE CEMENT

Direct all requests and inquiries to Dept. C. P. S.

LACLEDE-CHRISTY
Makers of fine heat resisting products
411 N. SEVENTH ST. LOUIS, MO. **SINCE 1844**

"I'd Rather Give Up My Whole Shop Than Give Up My Tornado Furnace Cleaner. Nothing Pays So Well."

An energetic furnace dealer in South Dakota believes furnace cleaning service is the greatest aid to the sheet metal worker.

He says, "Furnace cleaning gets you into homes that could never be approached by any other method." What an ideal plan for obtaining business under the FHA plan and securing profitable replacement business.

Keep step with the times and modernize your sales and service with the Tornado Furnace Cleaner—complete tools (chimney cleaner if desired), great power, more Tornado cleaners in use than any other type. Write for Free Trial offer.

BREUER ELECTRIC MFG. CO.
865 Blackhawk Street, Chicago, Ill.

With the Manufacturers . .

Penn Export Office Enlarged

The Penn Electric Switch Co., 2000 E. Walnut St., Des Moines, Iowa, reports that their export office was moved on July 15 into larger quarters at 100 Varick Street, New York City. A. R. Rocke is export manager.

◆

Minneapolis-Honeywell Changes

Minneapolis-Honeywell Regulator Company announces the following changes: The Detroit branch office has moved from 2847 Grand River to larger quarters at 415 Brainard Avenue. The Providence District office has moved from 803 Industrial Trust Building to 397 Elmwood Avenue, where in addition to having more floor space, they also have ample automobile parking space.

In the territory served from their Atlanta branch office they are establishing two new district offices, one in New Orleans, La., with Paul E. Seepe in charge, and the other at Charlotte, North Carolina, where Karl Selden will be in charge.

◆

Lennox Stages Dealers' Schools

Lennox Furnace Co., Inc., has recently held schools of instruction in warm air heating and residential air conditioning in Boston; Greensboro, North Carolina; Columbus, Ohio; and Marshalltown, Iowa. In all, ten meetings have been held with more than 600 Lennox dealers receiving instructions in the latest phases of heating. At all schools the new 1936 sales campaign was presented and a preview of the new oil-fired units was staged. A feature of the engineering discussion was the presentation of a simplified method of figuring installations for air conditioning.

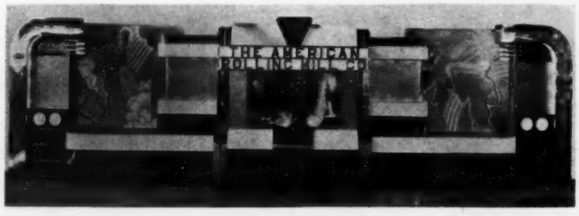
◆

Armco Exhibit

Intricate stainless steel etchings are part of a huge new and colorful background for exhibits recently fabricated for the American Rolling Mill Company, of Middletown, Ohio.

Stainless steel and porcelain enameled iron are the only materials used in its construction. Three wide panels at the bottom in the foreground have a porcelain enameled finish of blue and white. They provide the base for shelves on which products may be displayed.

In the center of the exhibit is a "trans-lite"—a transparent



negative in full color, illuminated from the rear. Scenes depicting various operations in the manufacture of iron and steel, including the continuous mill and the soaking pits, are displayed on the special negative. Immediately above the negative is the Armco triangle and the name of the company. On each side, stainless steel panels are provided for descriptive messages, and similar stainless panels are included at each end.

The large etching at the left symbolizes the beauty of stainless steel and porcelain; the etching at the right depicts strength and resistance to the elements.

For both the etchings and part of the background, Armco No. 6 soft finish stainless steel was used. Edges of the exhibit are of bright Armco 18-8 mirror-finish stainless steel.

IT'S

CAPITOL

FOR

FURNACE REPAIR PARTS

Every furnace man knows that in order to satisfy his customers he must do a good dependable job and do it quick.

Nobody likes to have a basement cluttered up for a week or ten days while waiting for furnace repairs, and whether a grate, firepot, shaker, damper, or even a new furnace is needed, the fastest and most dependable firm to deal with is CAPITOL.

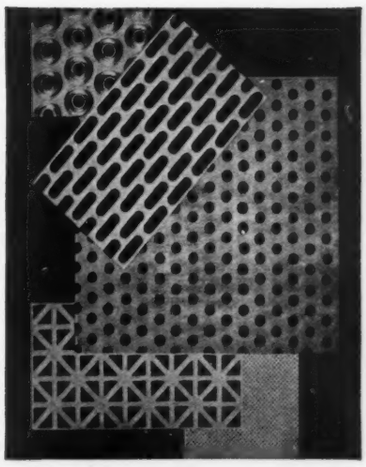
The repair season will shortly be in full swing and it's up to you to get your share of the new business and profits. Get and hold that trade by using CAPITOL repair parts exclusively.

Write today for the new, up-to-date catalog and also information on the 1936 line of warm air furnace and air conditioning units.

CAPITOL FURNACE & STOVE REPAIR CO.

229 S. Meridian, Indianapolis, Ind.

Where accuracy counts



THE fact that for over fifty years Wickwire Spencer has manufactured Perforated Metals for most exacting industrial purposes, assures the users of this Wissco product of a cleanness and accuracy of perforation alignment that is unusual in metals for Decorative Purposes.

WICKWIRE SPENCER STEEL COMPANY

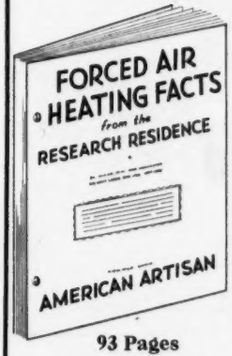
41 East 42nd Street, New York

Buffalo Worcester Chicago San Francisco

Send for this folder, "Wissco Decorative Perforated Metals." It shows scientifically planned designs offering both greater free air openings and concealment.

WICKWIRE SPENCER perforated metals

ALL UNDER ONE COVER!



93 Pages
Size 8½" x 11"

Complete Reprints of The First 21 Articles in Siechi Konzo's Great Series

"FORCED AIR HEATING FACTS FROM THE RESEARCH RESIDENCE"

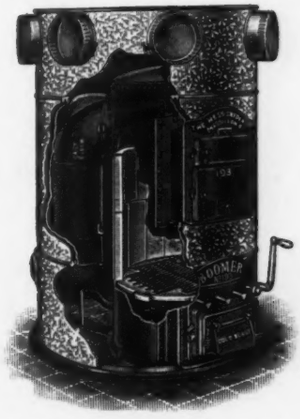
Now Available in a Neat, Loose-Leaf Binder for Only $1.00

Readers who are following Siechi Konzo's remarkable series presenting the Research Residence findings on forced air heating will be glad to know that all of the 21 articles published up to this month have been reprinted in full and put together in a handy, loose-leaf binder. Those who became subscribers after this important series began, those who have lost back numbers containing these data, as well as those who want all of this valuable information under one cover for quick and easy reference, should have a copy of this binder. It contains 93 (8½" x 11") pages of data, and is priced at only $1.00.

To get a copy, forward your order and remittance today to the address shown below.

AMERICAN ARTISAN

6 North Michigan Avenue Chicago, Illinois



Boomer Boiler Plate Furnaces

Also made with duplex grates and upright shaker.

Have been successfully made for 23 years. Where introduced have given satisfactory service. The fire pot liners are the best we can buy and we know of several Boomers that still have the original liners in, which are 23 years old. We have been making cast iron Boomers for 50 years.

If you are interested in selling a strictly high grade furnace, ask for prices and agency.

Nothing but the best of material enters into the making of Boomers.

When repairs are needed, avoid risk of dissatisfaction by ordering direct from the original patterns. Prices are low.

We sell to legitimate dealers only.

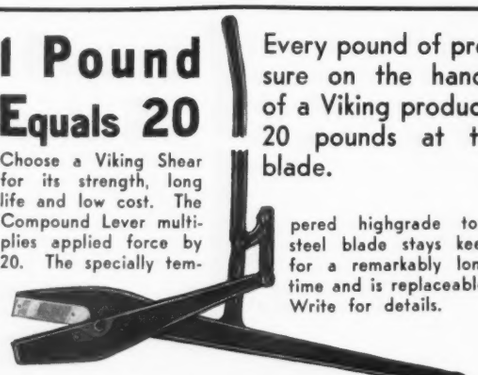
THE HESS-SNYDER CO., MFRS.

Massillon, Ohio

1 Pound Equals 20

Choose a Viking Shear for its strength, long life and low cost. The Compound Lever multiplies applied force by 20. The specially tempered highgrade tool steel blade stays keen for a remarkably long time and is replaceable. Write for details.

Every pound of pressure on the handle of a Viking produces 20 pounds at the blade.



VIKING SHEAR CO. Erie, Pa.

KEEP OLD MAN WINTER ON THE RUN

XX TH CENTURY HEATING & VENTILATING CO.
AKRON, OHIO

Fluxes ALL Metals QUICKLY WITHOUT ODOR OR CORROSION

Assures strong neat joints. Highly recommended for Sheet Metal Work. Available in liquid or paste flux, acid or rosin core solder. A Test Will Prove It Best. Write for—

FREE SAMPLE

RUBY CHEMICAL CO.
66 McDowell St. Columbus, Ohio

Rubyfluid

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 114.

342—Anchor Stove Literature

Anchor Stove & Range Company, New Albany, Indiana, has recently published a 16-page catalog, Form 16-B-36, covering their bituminous and anthracite stokers.

◆

343—Meyer Abbreviated Catalog

F. Meyer & Bro. Co., Peoria, Illinois, is distributing an "abbreviated" catalog as a reminder of the things they make and sell—everything needed in the installation of warm air furnaces and air conditioning jobs, they say.

◆

344—Dealer Advertising Series

Century Engineering Corporation, Cedar Rapids, Iowa, has just released a series of illustrated and written newspaper advertisements for insertion in local newspapers by dealers.

◆

345—Simplex Damper Regulator Sets

Ohio Products Company, 17606 Milburn, Cleveland, Ohio, is distributing folders containing the outstanding features of Simplex Damper Regulator Sets—positive lock, knurled and creased—not friction held, made of steel and unbreakable, positive airtight, 180 deg. adjustable, damper position.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave.
Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Check numbers in which you are interested):

86	87	88	89	90
91	92	93	94	95
96	97	98	99	100
101	102	103	104	105
106	107	108	109	110
111				
321	322	323	324	325
326	327	328	329	330
331	332	333	334	335
336	337	338	339	340
341	342	343	344	345

Name ..... Title.....

Company .....

Address .....

Are you Manufacturer—Jobber—Dealer—

FAULTLESS REPAIR PARTS *from the original Graff patterns for the following furnaces:*

FAULTLESS—COMFORT FAULTLESS—SCIENTIFIC COMFORT RIVAL
FAULTLESS—LACKAWANNA LACKAWANNA CAPITAL PHILADELPHIA

are carried in stock by the following Supply Houses

PHILADELPHIA, PA.
Aetna Stove Co., Inc.
Central Stove Repair & Fdy. Co.
Standard Stove Repair Co.
M. Stein.
United Stove Repair Co.
Weinstein Supply Co.

WASHINGTON, D. C.
Fries, Beall & Sharp Co.

NEW YORK CITY
Faultless Range & Mfg. Co.
G. A. Feld Company

BOSTON, MASS.
Henry N. Clark Co.
Huse & Carleton, Inc.
Waverly Heating Supply Co.
Republic Pipe & Supply Corp.

NEWARK, N. J.
Eseigroth & Co.

NEW BRUNSWICK, N. J.
New Brunswick Stove Co.

NEW HAVEN, CONN.
New Haven Stove Repair Co.

BRIDGEPORT, CONN.
Lipnick Stove Repair Co.

HARTFORD, CONN.
Hartford Stove Company

PROVIDENCE, R. I.
E. S. Hallock Co.

SPRINGFIELD, MASS.
The Burden-Bryant Co.

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MINNEAPOLIS, MINN.
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MILWAUKEE, WIS.
Milwaukee Stove & Fce. Repair Co.
The Speich Co.

CHICAGO, ILL.
Associated Heater Parts Co.
M. Brucker.

SEATTLE, WASH.
Colcock Furnace Company

DETROIT, MICH.
Detroit Stove & Fce. Repair Co.
Star Steel Supply Co.

FORT WAYNE, IND.
Wayne Pattern & Fdy. Co.

BUFFALO, N. Y.
O. G. & D. H. Donaldson.
Minet Heating Supply Co.

BINGHAMTON, N. Y.
Daniel G. Carver

PITTSBURGH, PENNA.
The Graff Co.
A. H. Johnson Co.
Shamblen Furnace Parts Co.

ROCHESTER, N. Y.
Henry Siebert Sons, Inc.

SYRACUSE, N. Y.
Stove & Furnace Repair House

ELMIRA, N. Y.
C. Arthur Miller & Son.

SCRANTON, PENNA.
Samuel Weinberg & Sons, Inc.

WILKES-BARRE, PENNA.
Wilkes-Barre Hdwe. & Stove Co.

ALLENTOWN, PENNA.
Pennsylvania Supply & Mfg. Co.

FAULTLESS HEATER CORP'N MANUFACTURERS Successor to THE GRAFF FURNACE COMPANY **Cleveland, Ohio**

GET IT FROM
METZNER !

. . . . . We have in stock, ready for immediate shipment, everything needed by the furnace man to do a complete job in double-quick time.

Write for Order Blank

*OUR REPAIRS FIT!

We Carry large stocks of feed sections.

METZNER STOVE REPAIR CO.

Est. 1880

KANSAS CITY MO.

Ask for ...
BURNLEY TRADE MARK

SOLDERING . . . . . PASTE
SOLDERING . . . . . SALTS
SOLDERING . . . . . STICK
SOLDERING . . SOLUTION
PIPE JOINT COMPOUND

Burnley Battery & Mfg. Co., North East, Pa.

HOTEL LENOX

Comfortable rooms—Attentive service—Memorable meals at fixed, fair prices—Only 5 minutes from the business district yet removed from downtown din—Rates, $1.50 to $3.00 per day per person—Descriptive folder containing map of downtown Buffalo mailed upon request.

140 NORTH ST. NEAR DELAWARE AVE.

CLARENCE A. MINER PRESIDENT

BUFFALO, N. Y.

IRONSET

the Furnace *and* Retort Cement

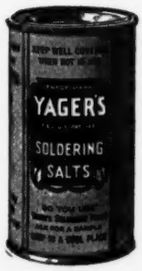
THAT IS

GUARANTEED

Not to crack, bloat, shrink or blister

A Fireline Product— Write for Circular

Fireline Stove & Furnace Lining Co., 1866-G Kingsbury St., Chicago



TRADE MARK
YAGER'S
REG. U. S. PATENT OFFICE

SOLDERING SALTS

SAFE ~ FAST EFFICIENT

AT ALL GOOD JOBBERS IN U. S. AND CANADA

ALEX R. BENSON, INC., HUDSON, N. Y.

MANUFACTURING SINCE 1873

THE GRAND RAPIDS FURNACE CLEANER

is engineered throughout for the use of heating men.

"A Plan To Increase Your Sales" that will work for you goes with the machine. Let this sturdy, refined unit prove its value by our FREE TRIAL. We offer CONVENIENT TERMS and a REASONABLE PRICE. Quality is our watch-word. Write for details.

GRAND RAPIDS FURNACE CLEANER COMPANY
GRAND RAPIDS, MICHIGAN

ESTIMATING BOOK *FREE!*

Net cost of individual runs of warm-air and cold-air pipe for quick estimating. Also net prices on all registers, piping and supplies.

Up-to-the-minute information and prices on blowers and forced-air jobs, with valuable tables.

No obligation. Send coupon today.

ROCK ISLAND REGISTER CO.
Rock Island, Illinois

Mail free estimating book without obligation to

Name .....

Address .....

Factory Heating

(*Continued from page* 85)

obtained by subtracting item 12 from item 11.

Item 13 is exposure direction. As our building faces in four directions we give it an overall average of 25%.

Item 14 is room temperature and is 65 degrees.

Item 15 is wall loss in B.t.u. per hour. Our loss is net square feet of wall times the factor for wall or item 15 times factor in item 7 equals 4468 times 18 equals 80,424 B.t.u. for item 15.

Item 16 is window loss in B.t.u. per hour. Ordinarily this would be item 11 times item 6 but we have the glass skylight to add here. In some cases this skylight is added after the exposure item 18 is estimated, but this skylight has no fire wall to protect it from the prevailing winds, hence is an exposure hazzard. So we add the glass area of the skylight (1071 square ft.), to the glass area in item 11 equals 1071 + 1756 equals 2827 times factor in item 6 equals 2827 times 78 equals 220,506 B.t.u. for item 16.

Item 17 is item 16 plus item 15.

Item 18 is item 13 times item 17 or 25% of item 18 equals 75,232 B.t.u.

Item 19 is floor loss in B.t.u. per hour. Only floors within 10 feet of outside need be calculated. We may also deduct the area adjacent to the heater as this floor will be warm whenever the heating plant is in operation. This leaves us an area of 3220 square feet times the factor in item 4 equals 3220 times 10 equals 32,200 B.t.u. for item 19.

Item 20 is square feet of ceiling (in our case item 3) times factor in item 5 equals 8520 times 22.75 equals 169,464 B.t.u. for item 20.

Item 21 is item 8 times item 9 or linear foot of crack times B.t.u. per foot equals 274 times 146 equals 40,000 B.t.u. per hour for item 21.

Item 22 is the sum of items 17-18-19-20-21 equals 617,826 B.t.u. for our total heat loss for item 22.

Items 23 and 24 are disregarded in our problem.

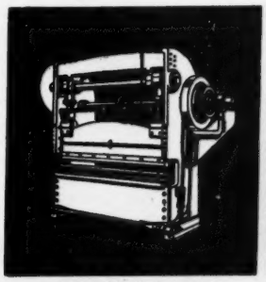
Item 25 is air supply in c.f.m. Our c.f.m. is contingent on the register temperature. As we stated earlier in this chapter the register temperature is figured at 145 degrees, hence we divide the B.t.u loss in item 22 by the factor 74.88 equals 8250 c.f.m. for item 25.

The factor by which the total B.t.u. loss is divided to calculate the c.f.m. is taken from the table in Fig. 9. Find the room temperature to be maintained in the left-hand side of the table, move to the right until under the desired inlet temperature given in the top line and multiply this figure (in our case 1.248) by 60 for the factor.

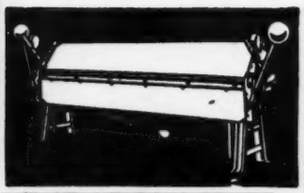
Perhaps a word might be said here regarding the data sheet used. This sheet has the advantage of listing the rooms served horizontally and the losses vertically so that all the losses for each room can be totalled from a vertical column and each type of loss read across to see that each loss is accounted for in each space treated.

In the next article we will consider the problems of application of apparatus and discuss the various ways in which the results specified can be obtained.

Spacious Comfort
IN CHICAGO
Auditorium hotel rooms are large, spacious and comfortable with beds that were really made for restful slumber.
WITH PRIVATE BATH FROM $2.50
WITHOUT PRIVATE BATH – $1.50
Live on Michigan Avenue, close to the Loop, when you visit Chicago. Enjoy the traditional luxury of the Auditorium Hotel–yours now at an extremely moderate cost.
AUDITORIUM Hotel
MICHIGAN AVENUE AT CONGRESS ST.



CHICAGO



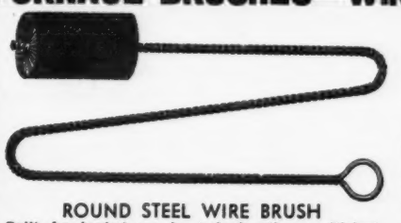
PRESS BRAKE **HAND BENDING BRAKE**

Steel Brakes—Presses—Shears

DREIS & KRUMP MFG. CO.

7404 LOOMIS BLVD. **CHICAGO**

FURNACE BRUSHES—WIRE or FIBRE



ROUND STEEL WIRE BRUSH

Built for hardest use by trained artisans. Highest quality, oil tempered steel, double twisted wire stem. Special sizes to meet any requirement. Write for circular.

SCHAEFER BRUSH MFG. CO.

1007—S. 2ND ST., MILWAUKEE, WIS.

SCHAEFER GUARANTEED

Which means, that you must and will be satisfied with any SCHAEFER brush you buy.

SCHAEFER BRUSHES

BUY SCHAEFER-IT'S SAFER

CLASSIFIED ADVERTISING

4 cents for each word including heading and address. Count seven words for keyed address. Minimum $1.00 for each insertion. One inch $3.00. Cash must accompany order. Copy should reach us eight days in advance of publication date. Display rates for this page will be furnished on request.

FOR SALE

FOR SALE: To close estate. A complete plant manufacturing sheet metal ornaments and statuary. Only four of its kind in the United States, Brooklyn, N. Y., Chicago, Ill., St. Louis, Mo., Seattle, Wash. If interested address Key 379, "American Artisan," 6 No. Michigan, Chicago.

FOR SALE: One heating unit, consisting of blower, steam coils and housing. Cheap if taken at once. Address Sheet Metal Contractors Ass'n of Wisconsin, Mr. George Bishoff, 1351 Main Street, Marinette, Wisconsin.

SITUATIONS WANTED

SHEET METAL ESTIMATOR and General Superintendent now situated with one of the best known firms in the East, desires to change. Very best references. Address Key 381, "American Artisan," 6 No. Michigan, Chicago.

SITUATION OPEN

SALESMAN—Now calling on dealers, contractors and sheet metal men to sell forced air heating equipment. Can be handled with present lines. Substantial commission. Several desirable territories open. Address Key 380, "American Artisan," 6 No. Michigan, Chicago.

MISCELLANEOUS

Patents and Trade Marks

Philip V. W. Peck

Barrister Bldg., Washington, D.C.

RIBBED WIRE GLASS-13c per SQ. FT.

STOCK SHEETS, CASE LOTS, PLUS BOXING F. O. B. BUFFALO, N. Y. SHIPMENT TO ANY PART OF THE UNITED STATES

QUOTATIONS ON ALL KINDS OF GLASS ON REQUEST

Write for Samples

T. J. ATCHESON GLASS CO.

953 Main St., Dept. A, Buffalo, N. Y.

Use AMERICAN ARTISAN Classified Advertising for quick results. It puts you in direct touch with the buyers and sellers in the warm air heating, sheet metal contracting and air conditioning industry.

FOR SALE

Sheet Metal Machines

New and *Really Rebuilt*

A machine for every use and every machine is ready for use. The largest stock in Chicago. Ask for list.

Complete supplies and tools.

MAPLEWOOD MACHINERY CO., Inc.

Chicago

2634 W. Fullerton Ave. Brunswick 9200

561 W. Washington Blvd. State 1405

? ? ? ? ? ?

HAVE YOU A SHEET METAL PROBLEM: FORMING—BENDING—PUNCHING—SHEARING

WE HAVE A MACHINE FOR EACH OPERATION ON SHEET METAL

Your Inquiries Earnestly Solicited

WARD MACHINERY CO.

SPECIALISTS

MACHINES — TOOLS — SUPPLIES FOR SHEET METALS

562 W. Washington Boulevard

CHICAGO, ILLINOIS

JOHNSON'S

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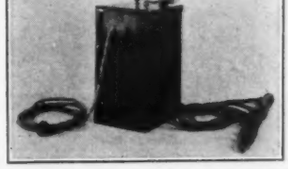

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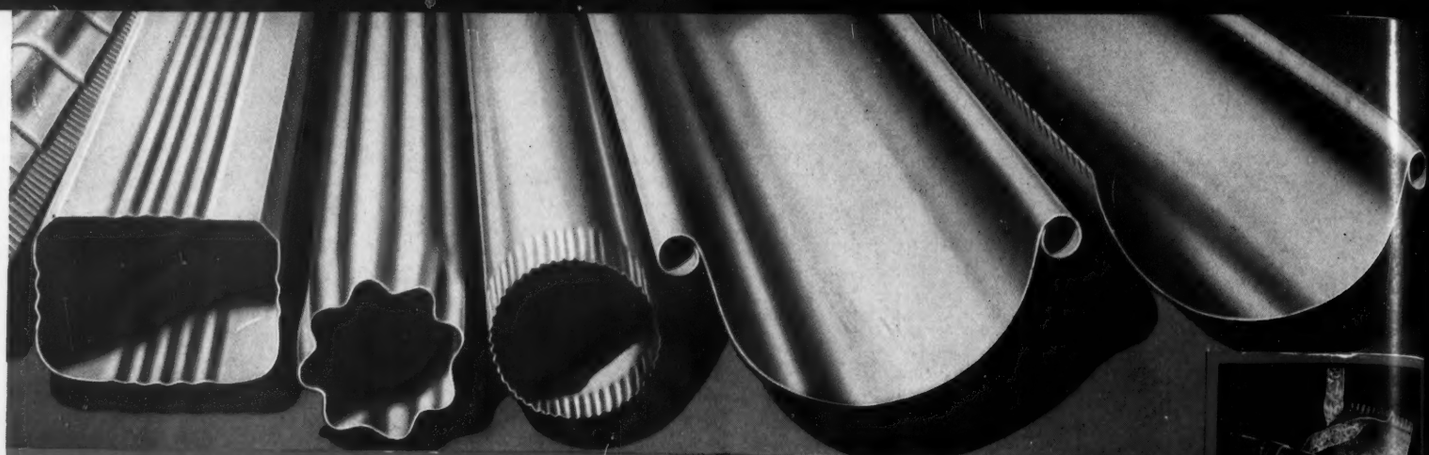

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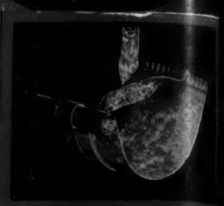

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